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INDO-ARYAN NAMES FROM MITANNI, NUZI, AND SYRIAN DOCUMENTS

P.-E. DUMONT
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IN 1929, Johannes Friedrich, having collected and sifted all the material accessible at that time, published, in the Reallexikon der Assyriologie, under the word 'Arier,' a very good article, in which he explained, by Indic or Iranian etymologies, 17 personal names from the cuneiform documents. This article is still the best that has been published on the subject. In 1933, N. D. Mironov published an article on the same subject in Acta Orientalia: 'Aryan Vestiges in the Near East of the Second Millenary B. C.' But, according to the best experts, his method is very unsatisfactory. Mironov had in his list some 27 names which certainly or very probably are Indo-Aryan; but he had also a great many Egyptian, Semitic, and miscellaneous names, which are certainly non-Aryan. Since that time great progress has been made in the deciphering of the Mitanni, Nuzi and Syrian documents; and as exhaustive as now possible a list of names of kings and nobles suspected to be of Indo-Aryan origin has been prepared by Roger T. O'Callaghan and W. F. Albright.[1]

The list contains 81 names (13 from the Mitanni, 23 from the Nuzi, and 45 from the Syrian documents). Among the names of this list, a few have already been explained, and correctly explained, by Mironov or his predecessors; but, in many cases, I do not accept the etymology he has suggested. Many of the etymologies I am proposing, or accepting, are hypothetical; but some of them seem absolutely certain. For instance:

1. Swardāta (*š/s-u/w-a-r-d/t-ă-t/d-a*) = (Ind.) *Svardāta 'given by Heaven.'

2. Subandu (*s/š-u/o-p/b-a-n-d/t-u/o*) = (Ind.) Subandhu 'having good relatives or good kinsmen.'

3. Satuara (*s/š-a-t/d[t/d]-u-a-r-a*) = (Ind.) Satvara 'swift.'

4. Indarota (*e/i-n-d/t-a-r-u/o-t/d-a*) = (Ind.) Indrota 'upheld by Indra.' (Indrota is attested as a name in the RV and in the Śat. Br.)

5. Urudīti (*u/o-r-u/o-t/d-ĭ-t/d[t/d]-i*) = (Ind.) *Urudīti 'having wide splendour.'

6. Bīrasēna (*p/b-ĭ-r-a-s/š[s/š]-ĕ-n-a*) = (Ind.) Vīrasena 'possessing an army of heroes.' (Vīrasena is attested as a name in the Mahābhārata.)

7. Biridāšwa (*p/b-ĭ-r-ĭ-d/t-ă-s/š-w-a*) = (Ind.) *Vṛddhāśva 'possessing great horses.'

8. Bardašwa (*p/b-a-r-t/d-a-š/s-u/w-a*) = (Ind.) *Vārddhāśva 'the son of Vṛddhāśva.'

9. Bāyawa (*p/b-ă-y-ă-w-a*) = (Ind.) Vāyava 'the son of Vāyu, the god of wind.'

10. Bīryašura (*p/b-ĭ-r-y-a-s/š[s/š]-u-r-a*) = (Ind.) *Vīryaśūra 'the hero of valour.'

11. Bīryawādza (*p/b-ĭ-r-y-ă-w-ă-z/dz/ts-a*) = (Ind.) *Vīryavāja 'he who owns the prize of valour.'

12. Bīrya (*p/b-ĭ-r-y-a*) = (Ind.) Vīrya 'valour, heroism.'

13. Artadāma (*a-r-t/d-ă-t/d-ă-m-a*) = (Ind.) Ṛtadhāman (nom. Ṛtadhāmā) 'abiding in the divine Law.'

14. Artamna (*a-r-t/d-a-m-n-a*) = (Ind.) *Ṛtamna 'devoted to the divine Law, observing the divine Law.'

15. Auaššūra (*ă-u-a-s/š[s/š]-ŭ-r-a*) = (Ind.) *Avaśśūra 'the hero of help.'

16. Bīradzana (*p/b-ĭ-r-a-z/dz/ts-ă-n-a*) = (Ind.) *Vīraǰana 'whose men are heroes.'

17. Sumāla (*s/š-u/o-m-ă-l-a*) = (Ind.) Sumāla 'having beautiful wreaths. (Sumāla is attested as the name of a people in the Mahābhārata.)

18. Artamanya (*a-r-t/d-a-m-a-n-y-a*) = (Ind.) *Ṛtamanya 'thinking of the divine Law,' 'revering the divine Law.' (Cf. *punarmanya,* which is attested in the RV.)

19. Saumati (*s/š-ă-ŭ-m[m]-ă-t/d-ĭ*) = (Ind.) *Saumati 'the son of Sumati.' (Sumati 'the wise' is a very common name in the Sanskrit literature.)

20. Aitara (*ă-ĭ-t/d[t/d]-ă-r-a*) = (Ind.) Aitara 'the son of Itarā.' (According to Sāyaṇa, *Aitareya* means 'the son of Itarā,' and *Aitara,* which is attested in Pāṇini, has probably the same meaning.)

[1] The complete list, with detailed references and a full discussion of the material and its historical significance, will be published by Father O'Callaghan in a forthcoming volume of *Analecta Orientalia* (Pontifical Biblical Institute, Rome).

Less certain but still very probable are the etymologies of the following names:

21. Tuišrata (*t/d-u-[i]-s/š-r-a-t/d[t/d]-a*) = (?)(Ind.) *Tviṣratha 'having the chariot of terror or splendour.' (Final *ṣ* of the root has been preserved before *r* as in *ajuṣran*. Cf. Whitney 181a.) (Tveṣaratha 'having rushing or terrible or splendid chariots' is attested in the RV.)

22. Kalmašūra (*k/g-a-l-m-a-s/š[s/š]-ŭ-r-a*) = (?)(Ind.) Karmaśūra 'the hero of action.' (*r* is represented by *l*: common Hurrian dissimilation of liquids.)

23. Šaimašūra (*s/š-ă-ĭ-m-ă-s/š[s/š]-ŭ/o-r-a*) = (?)(Ind.) Kṣemaśūra 'the hero of peace or security.'

24. Sattawadza (*s/š-a-t/d[t/d]-ă-w-a-z/dz/ts[z/dz/ts]-a*) = (?)(Ind.) *Saptavāja 'who has won seven prizes or spoils' (*sapta* 'seven' appears as *satta* in the Hittite cuneiform transcription); or = (?)(Ind.) *Sāptavāja 'who has won the prizes at the horse races.'

25. Ardzawīya (*a-r-z/dz/ts-ă-w-ĭ-y-a*) = (?)(Ind.) *Ārjavīya 'straight, honest.' (Ārjavīya is not attested, but *ārjava* is attested.)

26. Aitagama (*a-i-t/d[t/d]-ă-k/g[k/g]-ă-m-a*) = (?)(Ind.) *Etagama 'having the gait of an antelope,' 'running like an antelope.'

27. Bīryasauma (*p/b-ĭ-r-y-ă-š/s-ă-u-m-a*) = (?)(Ind.) *Vīryasoma 'the moon-god of valour.' (Cf. Vīryacandra, which is attested as a name.)

28. Purdāya (*p/b-u/o-r-d/t-ă-y-a*) = (?)(Ind.) *Purudāya 'giving much.' (Cf. *śatadāya* 'giving a hundred.')

29. Ručmanya (*r-u/o-s/č/z/dz/ts-m-a-n-y-a*) = (?)(Ind.) *Rucimanya 'revering light.'

30. Sauššatti (*š/s-ă-u-s/š-s/š-a-t/d[t/d]-i*) = (?)(Ind.) *Sauṣapti 'the son of Suṣapti.' (*Suṣapti* = *Svaśva* 'having beautiful horses.')

31. Sumīda (*s/š-u/o-m-ĭ-t/d[t/d]-a*) = (?)(Ind.) Sumīḍha 'bountiful, liberal.' (*Sumīḍha* is attested as the name of a man in the RV.)

32. Swaditi (*s/š-[u]w-ă-t/d-ĭ-t/d-i*) = (?)(Ind.) Svadhiti 'the axe, the thunderbolt.' (*Svadhiti* is attested in the RV.)

33. Tsirtamyašta (*z/dz/ts-ĭ-r-d/t-ă-m-y-ă-s/š-t/d-ă*) = (?)(Ind.) *Citraṃyaṣṭṛ (nomin.: Citraṃyaṣṭā) 'making brilliant offering.'

34. Wāsasatta (*w-ă-š/s-a-s/š-ă-t/d[t/d]-a*) = (?)(Ind.) *Vāsasāpta 'possessing seven dwellings, possessing a heptad of dwellings.'

35. Wadzi (*w-a-z/dz/ts[z/dz/ts]-i*) = (?)(Ind.) Vājin (nomin.: Vājī) 'victorious.'

36. Warasama (*w-a-r-a-s/š-ă-m-a*) = (?)(Ind.) *Varasama 'equal to the best.'

37. Yamibanda (*y-ă-m-i-b/p-ă-n-d/t-a*) = (?)(Ind.) *Yamibandha 'connected with Yamin, bound with Yamin'; or = (?)(Ind.) *Yamibandhu 'the kinsman of Yamin.' (*yami* = *yamin*, in composition; Yamin 'the restraining, controlling, ruling [god].') (Cf. Vasubandhu and Devabandhu.)

38. Yamiuta (*y-ă-m-i-u/o-t/d-a*) = (?)(Ind.) *Yamyūta 'upheld, favored, protected by Yamin.' (Cf. Indrota.)

39. Wasdāta (*w/y-a-s/š-d/t-ă-t/d-a*) = (?)(Ind.) *Vasudāta 'given by the Vasus.' (Cf. Devadatta.)

40. Matiwādza (*m-a-t/d[t/d]-i-w-ă-z/dz/ts-a*) = (?)(Ind.) *Mativāja 'whose victorious power or wealth is prayer.' (Cf. the name Matidhvaja.)

41. Saušsatar (*s/š-ă-u-š/s-s/š-ă-t-a-r*) = (?)(Ind.) *Saukṣatra 'the son of Sukṣatra.' (Sukṣatra 'ruling well' is attested in the RV.)

42. Abirata (*a-p/b-i-r-a-t/d[t/d]-a*) = (?)(Ind.) Abhirata 'pleased, contented.'

43. Šunašūra (*s/š-u/o-n-ă-s/š[s/š]-ŭ-r-a*) = (?)(Ind.) *Śunaśūra 'the hero of prosperity.'

44. Sudarna (*s/š-u/o-t/d-a-r-n-a*) = (?)(Ind.) *Sudharaṇa 'supporting well.'

45. Tsitriyara (*z/dz/ts-i-t/d-r-ĭ-y-ă-r-a*) = (?) *Citrya-rai (nomin.: Citrya-rās) 'having brilliant property.' (Cf. RV: *bṛhad-rayi*.) (Cf. RV 10.3.7: *citrām rām*.)

If we carefully examine this list of names, we may make the following inferences:

1. The names of the list belong to a language that seems to be much more like Old Indic than Old Iranian. For instance, initial *s* is maintained, and not represented by *h*; the group *śv* is represented by *šw* and not by *sp* as in Avestan *aspō* corresponding to Sanskrit *aśva*. On the other hand Indic *j* is represented by *z* as in Avestan; and Indic initial *ṛ* is represented by *ar* as in Avestan *aršti*š corresponding to Sanskrit *ṛṣṭiḥ*. Both of these equivalences, however, are almost certainly graphic.

2. Most of the names of the list are Bahuvrīhi or Tatpuruṣa compounds.

3. There is good evidence that in the Old Indic or Indo-Aryan dialect to which the names belong,

already at the time of the documents, initial *v*, represented by *b*, was pronounced like *v*, while medial *v* kept its value of a semivowel and was pronounced like *w*. For instance, *Bīrasena* (= *Vīrasena*), *Bīrya* (= *Vīrya*), *Bīryašura* (= *Vīryaśūra*), *Bīryawadza* (= *Vīryavāja*), *Biridāšwa* (= *Vṛddhāśva*), and *Bāyawa* (= *Vāyava*), beside *Swardāta* (= *Svardāta*), *Satuara* (= *Satvara*), *Ardzawīya* (= *Ārjavīya*), and *Swaditi* (= *Svadhiti*). We find, however, initial *w* in a few names, e. g., *Wāsasatta* (= *Vāsasāpta*), *Wadzi* (= *Vājin*), and *Warasama* (= *Varasama*).

4. It seems that in the language to which the names belong, just as in Middle Indic, the group *pt* had become *tt*, as for instance, in *Wāsasatta* (= *Vāsasāpta*), *Sattawadza* (= *Saptavāja* or *Sāptavāja*) and *Sauššatti* (= *Sauṣapti* 'the son of Suṣapti').

5. It seems that, in this language, just as in Sanskrit, there were already the characteristic patronymic names with the *vṛddhi*-strengthening of the first syllable of the primitive word. For example: *Bardašwa* (= *Vārddhāśva* 'the son of Vṛddhāśva'), *Sauššatti* (= *Sauṣapti* 'the son of Suṣapti'), *Saumati* (= *Saumati* 'the son of Sumati'), *Bāyawa* (= *Vāyava* 'the son of Vāyu'), *Aitara* (= *Aitara* 'the son of Itarā').

6. There is strong evidence that the people who spoke that language worshipped Indra, Vāyu (the god of wind), Svar (Heaven), Soma, the Devas (the gods, the shining ones), and Ṛta (the divine Law). It seems that they also worshipped a god called Yamin 'the Tamer, the restraining, controlling, ruling god,' for we have the names *Yamibanda* (= **Yamibandha* 'connected with Yamin,' or **Yamibandhu* 'the kinsman of Yamin'), and *Yamiuta* (= **Yamyūta* 'upheld, favored by Yamin'). If we accept the reading *Wasdāta* and the equivalence *Wasdāta* = *Vasudāta*, we may assume that they also worshipped the Vedic gods called Vasus.

7. It seems that the people who spoke that language, were especially interested in horses and horse races. This assumption is based on such names as *Biridašwa* 'possessing great horses,' *Bardašwa* 'the son of Biridašwa,' *Tuišrata* 'having the chariot of terror' or 'having rushing or splendid chariots,' *Sauššatti* 'the son of Suṣapti (the man who possesses beautiful horses),' and *Sattawadza* 'he who has won seven prizes' or 'he who has won the prizes at the horse races.' And this agrees with the evidence of the Boğazköy documents and the Veda.

PEIPING PHONOLOGY[1]

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The phonetics and phonology of Peiping Chinese have been extensively studied.[2] The justification for yet another discussion is the approach, which is in some respects new. A detailed presentation

[1] Study of Chinese was begun in connection with the preparation of teaching materials for members of the Armed Forces, as part of the Program of the Language Section, Education Branch, Information and Education Division, ASF. The present paper was drafted during the tenure of a Grant-in-Aid from the Intensive Language Program, ACLS, Spring-Summer 1946. Of the dozen or more Chinese with whom the writer has worked, special mention is due Mr. Chaoying Fang, his collaborator, transcribing informant, and (save in the technical phases of phonology) co-analyst for several years. A number of colleagues read an earlier version of this paper, and many constructive criticisms were received (not always acted on), especially from Yuenren Chao, Robert A. Hall, Jr., Zellig S. Harris, George L. Trager, and W. Freeman Twaddell. To all the individuals and agencies just mentioned, and to numerous others, the writer is deeply indebted.

[2] Each of the alphabeticizations of Chinese (Wade, Wade-Giles, Latinxua, Chinese National Romanization, Yale, and the usual Cyrillization) reflects a more or less sophisticated phonological analysis. The following is a partial list of discussions not ancillary to the devising of an alphabetization (those the writer was not able to consult in preparing this report are in brackets):

[Y. R. Chao, Singing in Chinese, Le Maître Phonétique, 3.39.9-10 (1924).]

Lawton M. Hartman 3rd, The segmental phonemes of the Peiping dialect, Language 20.28-42 (1944).

of this approach would be out of place here, but brief mention of its major points will render the body of the paper more readily intelligible:[3]

(1) Any articulatory event which occurs in a certain position in some utterances of a language, but not in all, is *distinctive*. Any feature which characterizes all the utterances of the language is non-distinctive. Likewise, a feature which does not regularly occur at least in all repetitions of one particular utterance, is non-distinctive. This is a somewhat wider definition of "distinctive" than has been customary. For example, in English the difference between the aspirated *t* of *till* and the unaspirated *t* of *still* has usually been termed non-distinctive (or "non-phonemic"); we cannot so classify it, since whenever one says *still* the aspiration is absent, and whenever one says *till* the aspiration is present. Any such feature must be accounted for in our phonological description. It is true, as Bloomfield points out,[4] that in our examination of a language we may miss some such features, because of the accidents of our training; such difficulties are encountered in many branches of science; we do the best we can.

(2) Within the total mass of distinctive material in a language, we find a relatively small set of *determining features,* characterized as follows: (a) if two articulatory events (or what might be described in purely phonetic terms as two articulatory events), **a** and **b**, are so distributed that **a** occurs only and always in conjunction with **b**, they constitute a single determining feature; (b) two articulatory events, **a** and **b**, so distributed that **a** occurs only when **b** occurs, but that **b** occurs also without **a**, are two determining features; (c) if **a** occurs both with and without **b**, and vice versa, **a** and **b** are two determining features. But an articulatory event **a** is not a determining feature at all, nor part of one, if its occurrence is predictable in terms of the occurrence and arrangement of those events which are determining features; for example, if **a** is found with **b**, with **c**, and with **d**, but nowhere else, and neither **b**, **c**, nor **d** is found without **a**, then **a** is not a determining feature. Distinctive features which are not determining are *determined features.* Often one may divide the total stock of distinctive material into determining and determined, and itemize the determining features, in more than one way; such differences of statement are stylistic, in no way reflecting facts about the language being described.[5]

(3) In the examination of the raw data, we avoid the (usually unstated) linearity-assumption to which our tradition of linear orthography renders us susceptible. Two features, that is, may occur successively (dental closure and labial closure in *hatpin*), or simultaneously (labial and velar closure in some African languages), or in various overlapping sequences. Bundles of simultaneous or immediately adjacent features are given no priority, save precisely for the purpose of deriving an essentially linear notation; this purpose is phonologically irrelevant, though such a notation is useful, if not unavoidable, in making phonological statements.

(4) We ignore all considerations of grammatical structure, including such matters as morpheme or

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[Daniel Jones, Chinese tones, Le Maître Phonétique 28.95-6 (1913).]

B. Karlgren, A Mandarin phonetic reader in the Pekinese dialect, Arch. d'Études Orientales 13.23; Upsala, 1917.

Jos. Mullie, The structural principles of the Chinese language, Anthropos Linguistische Bibliothek vols. 5, 6; Peiping 1932, 37.

Morris Swadesh, A condensed account of Mandarin phonetics, TCLP 8.213-6 (1939).

[L. T. Wang, Recherches expérimentales sur les tons du Pekinois, Arch. Néer. Phon. Exp. 13.1-40 (1937), 14.1-48 (1938).]

[. . . ., Whispering in Chinese, Le Maître Phonétique, 3.40.4 (1935.]

[3] See also the writer's earlier discussion, A system of descriptive phonology, Language 18.3-21 (1942) (except §§ 6-7, now superseded).

[4] Leonard Bloomfield, Language (New York, 1933), 84 and elsewhere.

[5] An analogy may be helpful. In stating the law of gravitation, one says that the force of attraction between two bodies varies, among other things, inversely as the *square* of the distance between them. It would be just as accurate to say, "inversely as the 1.99997 power of the distance between them," or "inversely as the 2.0003 power of the distance between them;" our techniques of measurement do not allow of sufficient precision to judge between these alternatives. In such a case we choose, for simplicity's sake, the nearest "round number," keeping clearly before us the degree of relative accuracy thereby attained. The analogy breaks down, however, in that, as yet, we do not know how to decide which of two phonological descriptions is the "rounder." Apparently the only legitimate use of the criterion of economy in science is in matters of this kind: where applicable, it gives us neater statements, but not necessarily more accurate ones.

word borders. The purpose of this is to avoid circularity: if phonology is dependent on grammatical analysis, then phonology is just so much the less useful as a tool in grammatical analysis. Suppose, for example, that following the procedure here recommended we find in a particular language a type of open juncture, and then, when grammatical examination has been carried to the point of identification of words (= minimum free forms), discover that word-boundary coincides always, or usually, with this type of open juncture. Such a correlation is of importance; in some languages it does not exist. But if we had merely assumed that word-boundaries are phonologically relevant, the discovery of the juncture, and thus of the correlation between open juncture and word-boundary, would have been impossible.

(5) Phonological description thus consists of: (a) a list of the determining features (with alternative statements if alternatives exist); (b) a statement of the arrangements in which determining features occur in utterances; (c) a statement of the circumstances under which each determined feature occurs. This itemization is logical; the actual arrangement of one's statements will of course depend on the specific problem.

The body of this paper will serve as an example in extenso of the principles just listed.

We describe a dialect with a maximum number of phonemic distinctions.[6] Simpler patterns, perhaps more common in Peiping, are more easily dealt with in terms of the complex type than vice versa.

1. Segmentation. A Chinese utterance has two simultaneous components: a *register-contour,* and a sequence of one or more *macrosegments.*[7]

A macrosegment is bounded by *macrojunctures,* and has two simultaneous components: an *intonation* and a sequence of one or more *mesosegments.*

A mesosegment is bounded by *mesojunctures,* and has two simultaneous components: a *stress-contour* and a sequence of one or more *microsegments.*

A microsegment is bounded by *microjunctures,* and has as its simultaneous components a *stress,* a *tone,* and a *residual structure* (of vowels and consonants).[8]

2. Junctures. All the junctures to which names are assigned above are open. We find no need to postulate also a close juncture; in terms of the present system, close juncture is the absence of all open junctures.

Microjuncture is a zero-point of sonority,[8a] a clear and unambiguous point of syllable division; symbol / / (space).

Mesojuncture is a slight pause. It occurs only in combination with microjuncture, and the combination is symbolized / , /.

Macrojuncture is a pause, often no longer than mesojuncture, but sometimes long enough for a breath to be taken. The constant distinction is that macrojuncture falls at the juxtaposition of two intonations, whereas mesojuncture without macrojuncture falls within a single intonation. Macrojuncture occurs only in combination with the two less open types; symbol for the combination of the three /;/; except that at the end of an utterance we write /./ or /?/ (the choice dependent on intonation) instead of /;/.

3. Register-contours and Intonations. The analysis of these features is as yet incomplete; we try to supply categories enough to take care of the maximum number of distinctive features of the kind that may be discovered.

By "register" is meant the range of pitch at any particular place in an utterance, within which the ups and downs of pitch which constitute intonations and tones take place. The most typical, and best identified, of the register-contours is found in utterances of at least four or five macrosegments' length: wide at first, narrower and with a lower average pitch in the interior, and wider again, but

[6] Essentially that of Chaoying Fang (b. Tientsin, educated Peiping) and Victor Ch'üan (b. Paris, educated Peiping); where these differ, the more complex type is chosen.

[7] This systematic, though somewhat unwieldy, terminology is introduced here primarily because it seems inadvisable to extend the meaning of the term *syllable* so as to cover segments which, in the traditional meaning, may be "disyllabic" (i.e., have two peaks of sonority); see § 8.1.

[8] *Residual structure* is what has heretofore been called *linear* or *segmental* structure. The latter terms are unsatisfactory because the structure referred to (in Chinese, at least) is *not* linear. "Residual" is also not too fortunate, but it will serve until a better expression has been found.

[8a] Paul Benedict (private conversation).

still somewhat lower than at the beginning, in the terminal macrosegment.[9]

However, this and other register-contours may be, not independent features, but rather automatic resultants of the sequence of intonations on successive macrosegments, and of the number of macrosegments in the utterance.

The clearest thing about intonations is their scope: there is usually little doubt as to where a particular intonation begins and ends. The exact nature and number of the intonations is less clear. For the last macrosegment of an utterance, we indicate by terminal / . / a lowering of pitch from the nuclear stress (§ 4) to the end, and by / ? / the absence of such a fall in pitch; thus, in short utterances: / ' tuei^4 me? / 'Is that right?' : / ' tuei^4 le. / 'That's right.' Under / ? / we are probably lumping together several phonemically distinct types; possibly also several are covered by / . /.

A third clearly recognizable intonation, for which no symbol is here provided, consists of a squeezing of the pitch-range into a narrow band at median level, with only slight variations of stress (probably no nuclear stress) and relatively rapid articulation. This occurs, for example, in short introductory phrases before a direct quotation: / tha^1 ' srue^1; ' hau^3. / 'He said "OK."'

4. Stress-contours and Stresses. The stress-contour of a mesosegment consists of varying degrees of prominence (produced largely by volume, but partly by length and speed) of its constituent microsegments. The position within the mesosegment of the microsegment of greatest prominence is not predictable, nor, given the position of this, are the degrees of prominence of the remaining microsegments. Therefore the degree of stress of each component microsegment has to be recognized as phonemically primary, and the stress-contour of the mesosegment is an automatic resultant thereof.

The most prominent microsegment in a mesosegment bears *loud stress* (/ ' / before the microsegment). The remaining microsegments bear *quiet stress* (/ , /), or no stress at all (unmarked; "zero stress" if that terminology is preferred).

In addition, in macrosegments bearing certain intonations (e. g., / . /), it is necessary to specify one of the loud stresses in the macrosegment as the nuclear stress, the stressed element at which the intonation turns. The nuclear stress is often, but not always, the last loud stress in the macrosegment. Since its location is not predictable, nuclear stress must be recognized as phonemically distinct from loud stress. No separate symbol is here provided, however, because none of the forms cited require distinctive marking of the nuclear stress in contrast to high stresses.

Finally, in some cases one finds an extra-loud *contrastive stress* (/ " /) instead of a loud stress; further intonational analysis may eliminate this as a separate stress-level.

5. Tones. The tones are contrasting contours of pitch, volume, glottalization, and length. There are six tones; we number five of them, indicating them by superscript numerals after the microsegment; the sixth is indicated by the absence of such marking, and a microsegment bearing it is referred to in the discussion as "toneless."[10]

Toneless microsegments are staccato; microsegments with a tone are legato. Staccato microsegments have an observable pitch ("high," "low," etc.), but only legato microsegments have a discernible pitch-contour ("level," "rising," "falling").

Pitch: / ^{1} / and / ^{3} / are usually level, and have contrasting pitches as their distinguishing features: / ^{1} / is high, / ^{3} / low. / ^{2} /, / ^{4} /, and / ^{5} / have contrasting pitch-contours as their distinguishing features: / ^{2} / and / ^{5} / are rising, / ^{4} / falling. The rise for / ^{2} / begins and ends somewhat higher than that for / ^{5} /.

Volume: With loud stress (or nuclear or contrastive stress), / ^{1} / and / ^{2} / are crescendo, / ^{3} /, / ^{4} /, and / ^{5} / diminuendo. With quiet stress this contrast is sometimes audible; with no stress, never.

Glottalization: With loud stress, / ^{3} / and / ^{5} / often have glottal friction during the lowest-pitched phase of the contour.

Length: With loud stress, / ^{3} / is longest, / ^{4} / half-long, and the other three relatively short.

/ ^{1} / and / ^{3} /, though usually level, are on occasion not level. When / ^{1} / is accompanied by loud

[9] George A. Kennedy (private conversation).

[10] The numbering / ^{1} / through / ^{4} / is as in Wade-Giles Romanization; / ^{5} / is the so-called "raised-third" tone (usually not considered phonemically distinct from the second tone).

stress and followed by /;/ (possibly by /,/), there is sometimes a slight fall in pitch at the end; this variant is in some circles considered "elegant."[11] When /^{3}/ is accompanied by contrastive stress, it starts relatively high, but immediately dips to extra low; when /^{3}/ bears any loud stress and is followed by /;/, there is usually a terminal rise. The combination of these occasional features on a single microsegment with third tone cited in isolation is the source of the customary description of the third tone as "dipping."

With quiet stress or no stress, certain tonal distinctions are lost or facultatively lost. /^{5}/ is often not distinguishable in these circumstances from /^{2}/. In posttonic position in the mesosegment, with no stress, /^{1}/ and /^{2}/ are in free alternation. In the transcription we maintain the distinctions despite their optional loss (morphophonemically, on the basis of lexical identifications).

The pitch-range within which the contour constituting a tone is placed depends, of course, on the position of the microsegment relative to intonations and register-contours. It is also affected by the stress-level: with higher stresses the range is wider, with lower stresses narrower. The dynamic range for the crescendo or diminuendo contour of a tone is similarly affected by stress-level: greater range with higher stress, less with lower (none with no stress). For unstressed microsegments, with or without tone, the pitch-range is also conditioned by the terminal pitch of a preceding stressed microsegment in the same mesosegment, if any, and the initial pitch of a following stressed microsegment within the mesosegment, if any.

This last factor operates as follows: initially in a mesosegment, an unstressed microsegment tends towards mid or lower mid pitch. Finally in a mesosegment, such a microsegment has lower mid pitch if /^{1}/, /^{2}/, or /^{5}/ precedes, higher mid pitch after /^{3}/, and low pitch after /^{4}/. Flanked on both sides by stressed microsegments, within a single mesosegment, the pitch of the unstressed microsegment is a compromise between the terminal pitch of the preceding and the initial pitch of the following.

The phonemic status of the contrast between the first four tones can be demonstrated abundantly by lexical citation of free forms one microsegment in length, e.g.: /chru^1/ 'to exit' : /chru^2/ 'divided into'; /pau^2/ 'thin' : /pau^3/ 'to go bail for'; /cieu^3/ 'nine, wine' : /cieu^4/ 'thereupon.' The fifth tone does not appear on such elements, but can be demonstrated in free forms of two microsegments' length; our examples contrast it with the second and third tones, which are most similar: /'ta^5 pan^4/ 'make-up,' /'ma^5 fan^4/ 'annoying' : /'sr^2 heu^4/ 'time,' /'i^2 khuai^4/ 'one (dollar)' : /'mai^3 mai^4/ 'business,' /'u^3 khuai^4/ 'five (dollars).'[12] In all these examples, the second microsegments are facultatively toneless (see below).

Toneless microsegments cannot be demonstrated by direct lexical citation at all. There is a distinction, however, between the utterances /'hau^3./ 'OK' in answer to a question, and /'hau./ 'Yes, go on' said quietly over the telephone as an indication to the other party that one is following what is being said; the latter utterance has the intonation indicated by /./, but no tone. In longer utterances, toneless microsegments are common. Certain forms, such as the particle /te/ (mark of attribution), /le/ (completive aspect), /cre/ (continuative aspect), /me, ne/ (question), are always toneless, even when stressed: /ˌue^3 "te, 'pheng^2 ieu^3./ 'I said "my friend" using the attributive particle, not without the particle.' For some of these particles there are formal citation forms, /ti^4/ for /te/, /liau^3/ for /le/, with differing phonemic structures, based, as it happens, on the shape of morphemically distinct elements that are written with the same characters; this does not affect the present discussion. Many elements other than the particles listed above, for example, the second microsegments in the two-microsegment free forms cited in the last paragraph above, are regularly without stress, and optionally retain or lose their tones.

[11] Yuenren Chao (private correspondence).

[12] /'ma^5 fan^4/ is written with a sequence of two characters, read individually as /ma^2/ and /fan^2/; this has afforded the basis of a protest against the present treatment. If the writer's hearing has not been at fault, then either (a) the morphemic identification reflected by the orthographic convention is incorrect, or (b) the morphophonemics of tone must be considered more complex than has been customary. More probably (a) is the case: Chinese characters serve about as well as an indication of morphemic identities as the letters in English orthography serve as an indication of phonemic identities.

6. Residual Structure: Determining Features. Under constant conditions of register, intonation, stress, tone, and placement in utterance, macrosegment, and mesosegment, microsegments contrast on the basis of the occurrence or non-occurrence, and the arrangement, of the following fifteen determining features:[13]

- **p** bilabial position
- **t** apico-alveolar position
- **k** dorso-velar position
- **c** tongue-front position with sibilance or with affricate release
- **f** labiodental position
- **q** glottal position (for which **g** is always substitutable, though not vice versa)
- **S** unaspirated complete closure without nasalization
- **F** fricative spirant contact
- **N** nasalization, with stop closure or approximation thereto
- **l** lateral frictionless continuant
- **i** high-front tongue position
- **u** lip rounding
- **r** tongue retroflexion
- **e** mid tongue height
- **a** low tongue height.

The total stock of determining features in the language, therefore, consists of the register contours(?), intonations, junctures, stresses, tones, and the fifteen features just enumerated. Every linguistically relevant event in the speaking of Chinese is either one of these features arranged in a particular way relative to others, or a mechanically determined and predictable product of a particular arrangement of these features.

7. Residual Structure: Notation and Terminology. Some of the features listed above occur only in simultaneous bundles. Since it is inconvenient to transcribe other than linearly, we derive the symbols for inclosure between solidi from the symbols defined above in such a way as to eliminate the need for non-linear notation:

$$/\text{p t k c}/ = \begin{matrix}\text{p}&\text{t}&\text{k}&\text{c}\\ \text{S}&\text{S}&\text{S}&\text{S}\end{matrix},$$

$$/\text{f s h}/ = \begin{matrix}\text{f}&\text{c}&\text{q}\\ \text{F}&\text{F}&\text{F}\end{matrix},$$

$$/\text{m n ng}/ = \begin{matrix}\text{p}&\text{t}&\text{k}\\ \text{N}&\text{N}&\text{N}\end{matrix};$$

and, for the others, simply

$$/\text{l i u r e a}/ = \text{l i u r e a}.$$

The digraph "ng" saves a type-face, and leads to no ambiguity since "g" is not otherwise used.

"#" is used, when needed, for zero.

The following cover terms are used: /a e/ are *vowels*; /i u r/ are *semivowels*; /c s/ are *semiconsonants*; /p t k f h m n ng l/ are *full consonants*. Both the semiconsonants, and all but one of the full consonants, are simultaneous clusters; it is convenient to classify the successive cluster /ch/ also as a semiconsonant, and the successive clusters /ph th kh/ also as full consonants.

8. Residual Structure: Arrangements. The above definitions of the symbols for use between solidi are statements of phonemic structure: the definition of /p/, for example, at the same time states that the simultaneous bundle of **p** and **S** occurs as one arrangement of distinctive features in utterances.

Statements of arrangement still to be made are made in terms of the elements and simultaneous bundles described above, on the convenient assumption that all the remaining arrangements are linear successions of these elements or simultaneous bundles; later on we indicate at what points this assumption is false.

8.1. Types of Microsegments. Microsegments are *monosyllabic*, containing a single peak of sonority, or *disyllabic*, containing two peaks, the first much more prominent than the second. The latter type is much the rarer, and (probably) does not occur toneless.

8.2. Monosyllabic Microsegments. For the description of these we recognize four successive position for elements, symbolized as [1], [2], etc. Elements in position [1] are *initials*; the remainder is a *final*.[14]

[13] There are probably a number of alternative possibilities here; we may mention one. Instead of writing /c/, we could write /ts/; given a slightly different definition of **t**, we would define /s/ as simultaneous **t** and **F**, and make the necessary minor modifications of wording in ensuing sections. This would eliminate **c** as a separate determining feature. The difference seems trivial.

[14] Almost all earlier treatments of Chinese syllables (= our monosyllabic microsegments) make use of this initial-final division. The convenience of the device,

8.21. Initials. These fall into the following classes: / # /; / c ch s /; / n l /; / t th /; / p ph m /; / f /; / k kh h /; / ng /; / cr chr sr /; / r /.[15]

8.22. Finals. In position [2] occur /# u i iu/ in [3], / # e a /; in [4], / # i n ng u m r ir ngr ur /. The finals are listed in the Table.

(2) [4] elements other than / # / occur only with positions [2] and [3] not both empty.

(3) / r / as [4] does not occur with / # / as [3] and / i / as [2].

8.23. Combinations of Initial and Final. For combinations of an initial and a final which does not contain / r /, we say that the combination

TABLE OF FINALS

Group 1.									
#									
e	ei	en	eng	eu	em	er	eir	engr	eur
a	ai	an	ang	au	am	ar	air	angr	aur
Group 2.									
u			ung			ur		ungr	
ue	uei	uen	ueng		uem	uer	ueir	(uengr)	
ua	uai	uan	uang			uar	uair	uangr	
Group 3.									
i		in	ing		im				
ie				ieu		ier	ieir	iengr	ieur
ia	iai	ian	iang	iau		iar	iair	iangr	iaur
Group 4.									
iu		iun	iung			iur		(iungr)	
iue						(iuer)			
		iuan					iuair		

In the top row of each group, [3] is / # /; in the middle row, / e /; in the bottom row, / a /. The finals of a single group have the same element in [2]; those in a single column have the same element in [4]. The three parenthesized finals are morphologically to be expected but are not attested.

The following points, though implicit in the Table, are not obvious:

(1) / u / does not occur in both [2] and [4] of a final. The same is true of / i / in those finals which do not contain / r /, save for / iai /, which is rare and perhaps only literary.[16]

occurs if (1) there exists a morpheme consisting of such a shape (plus a tone), or part of which consists thereof (e. g., if the first microsegment of a two-microsegment morpheme has the required shape), or if, there being no such morpheme, (2) there is clear evidence that the shape in question, with some tone, is pronounceable as a nonsense-element. Such a combination is termed *literary* if the required pronunciation is assigned to a character in character-dictionaries, but the element does not occur in ordinary colloquial speech (and thus not at all in the speech of many individuals). For combinations of an initial and a final which does contain / r /, we say that the combination occurs if (1) there exists a morpheme or group of morphemes of the required shape, or if (2) the existence of such is morphologically to be expected, even if it has not been heard.[17]

however, seems not to reflect anything of a fundamental nature about the structure of the language (to the contrary: Bloomfield, Language, 182).

[15] An alternative is to eliminate the initial classes / cr chr sr/ and / r/, and to add two further groups of finals, one with / ru/ and one with / r/ in position [2].

[16] /ɹ tuan⁴ ˈiai²/ 'precipice' has an alternative form with /ia²/; /chiai³/ (Hartman, loc. cit., 39) has the alternative pronunciation /khai³/.

[17] Most elements with a retroflex final are bimorphemic, consisting of a first constituent without retroflexion in its final and a second constituent of retroflexion added

Finals with / m / as [4] are ignored until (12) below.

(1) Final /#/ occurs only with initials / c ch s, cr chr sr, r /.

(2) Initial /#/ occurs with all finals except / ung ungr /. / ung[1] / has been heard as an alternative pronunciation of the surname usually pronounced / ueng[1] /, but this is probably a non-Peiping or even non-Mandarin feature.[18]

(3) Finals / ueng uengr / occur only with initial /#/. / ueng / and / ung /, likewise / uengr / and / ungr /, may thus be in complementary distribution. / iai / seems to occur only with the initials /# ch /; both are literary.

(4) Initials / c ch s / do not occur with finals / ua uai uang uar uangr /; nor do the combinations / chei, chen, sen, seng, sengr / occur.

(5) Initials / n l / do not occur with finals / uei ua uai uar uangr iun iung iungr iuer iuair /. The only case of / len / is in a recently given personal name, where the use of a "non-occurrent" micro-segment was premeditated;[19] but the name is pronounced without difficulty by native speakers. / niue, liue, liuan / occur only in literary context; / ne / occurs only toneless; / nuang / is questionable; / nen, neu, nuen, luang, nia, niuan / are not attested.

Finals of group 4 do not occur with any of the initials yet to be discussed, save for a peculiar occurrence of / iu / (and possibly / iur /) after / k /: /ˌ chiue[3] ˈ kiu[4] / is the form assumed in a variety of "Pig-Latin" by ordinary /ˈ chiu[4] / 'to go.'[20]

(6) Initials / t th / do not occur with finals / ua uai uang uar uangr in ia iang iar iangr /. There are no cases of / thei, thieu /; / thuen / is literary. Dictionaries based on characters give no pronunciations involving / ten, then /, but these occur at least in / ten[4] / 'to pull on with sudden tugs' and /ˈ tung[4] then / 'to be not at rest.'

(7) Initials / p ph m / do not occur with finals / ieu ieur ia iang iar iangr /, and probably not with final / er /, nor with any of the finals of group 2 except / u ur ue uer /. There are no cases of / phe, peu /; / pheu / is literary; / pe, me / occur only toneless.

Finals of group 3 do not occur with any of the initials yet to be discussed.

(8) Initial / f / does not occur with the finals / e er ai au aur /, nor with any of the finals of group 2 except / u ur ue uer /.

(9) Initials / k kh h cr chr sr / occur with all finals not excluded by statements in the foregoing, except that there are no cases of / chrei, srung /; / chrua / is literary.

(10) Initial / r / does not occur with finals / ei a ai ar ua uai uang uar uangr /.

(11) Initial / ng / occurs only with final / e /, toneless (§ 10).

(12) Finals with / m / in position [4] are rare, and apparently confined to relatively fast speech (§ 8. 3). / em / occurs with initials / sr cr c /; / am / with / t th c /; / uem / with /#/; / im / with / n /. The following examples are exhaustive or almost so: / srem[2], cem[3], nem[4] / ~ / sreme[2], ceme[3], neme[4] / 'what, how, thus'; / crem[4], cem[4] / ~ / creme[4], ceme[4] / 'thus'; /ˈ tam[4] cr[3] / ~ /ˈ ta[4] me ˌ cr[3] / 'thumb'; / tham[1], cam[2] / ~ /ˈ tha[1] men, ˈ can[2] men / 'they, we'; / uem[3] / ~ /ˈ ue[3] men / 'we'; / nim[3] / ~ /ˈ ni[3] men / 'you (pl).'

Since more finals containing / r / are recognized in this analysis than is customary, examples are given here of all except the three parenthesized in the Table: / er[4] / ~ / air[4] / 'two'; /ˌ ai[1] ˈ meir[2] / 'go from door to door'; / hengr[2] / 'horizontal stroke' (in writing characters); /ˌ pi[3] ˈ theur[2] / 'pen point'; / par[3] / 'handful, bunch'; /ˌ siau[3] ˈ hair[2] / 'child'; / pangr[1] / 'group'; / phaur[4] / 'bulb'; /ˌ siau[3] ˈ srur[1] / 'small book'; / khungr[4] / 'free time'; /ˌ siau[3] ˈ sruer[1] / 'novel'; / khueir[3] / 'spool'; /ˌ siau[3] ˈ sruar[1] / 'small brush'; / uair[2] / 'to amuse oneself with'; / khuangr[1] / 'basket'; / ier[4] / 'leaf'; / tieir[3] / 'bottom' (as of a cup); / piengr[3] / 'cake'; / chieur / [2] 'ball'; / iar[2] / ~ iangr[1] / 'sprout, seedling'; / iair[4] / 'swallow' (bird); / tiaur[4] / 'melody'; /ˌ siau[5] ˈ iur[3] / 'shower, light fall of rain'; /ˌ hua[1] ˈ iuair[2] / 'flower garden.'

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according to a fairly complex pattern. The first constituents fall into certain grammatical classes; if an element of such a class exists having a certain phonemic shape, one may legitimately expect the existence of the corresponding bimorphemic form with retroflexion, whether one has heard it or not.

[18] Hartman, loc. cit., fn. 18, reports this presumably from a Peiping speaker.

[19] Information from Chaoying Fang.

[20] Victor Ch'üan (see fn. 6 above) speaks this jargon; Yuenren Chao, Eight varieties of secret language [in Chinese], Bull. of Inst. of Hist. and Philol. of Academia Sinica, 2.3.312-53 (1931).

8. 3. Disyllabic Microsegments. In these there are five positions for elements: [1], [2], and [3] as for monosyllabic microsegments, save that [2] and [3] are not both empty; [4′] one of the set / p t k c m n ng f s h l / (not all of these have been observed, but the nature of the alternation between two-microsegment sequence and single disyllabic microsegment [see below] is such as to suggest that the list is correct); [5] / e i u r /. The limitations of sequence in the first three positions are as for monosyllabic microsegments; if [5] is / i u r /, the same limitations apply to positions [4′]-[5] as to [1]-[2] in all microsegments.

Most disyllabic microsegments occur only in fast speech, being replaced at slower speeds by sequences of two monosyllabic microsegments, the first of which is stressed and has the tone of the disyllabic alternant, the second of which is unstressed and toneless or optionally toneless: / pusr^2 / ~ / ' pu^2 sr^4 / ' isn't '; / siesi^4 / ~ / ' sie^4 sie / ' thanks '; possibly / tulu^1 / ~ / ' tu^1 lu / ' cluster ' (as of grapes).[21]

A few disyllabic microsegments occur in either rapid speech or normal-speed speech, but in the latter case are paralleled by groups of two monosyllabic microsegments. All the cases citable have, also, in fast speech only, still shorter alternants consisting of a single monosyllabic microsegment: / crem^4, cem^4 / ~ / creme^4, ceme^4 / ~ / ' cre^4 me / ' thus, this way '; / nem^4 / ~ / neme^4, name^4 / ~ / ' na^4 me / ' thus, that way.'

There are two disyllabic microsegments which have the shorter alternant just mentioned, in rapid speech, but no two-microsegment replacement except as a highly artificial reading-pronunciation: / srem^2 / ~ / sreme^2 / ~ (reading-pronunciations) / ' sren^2 ma^4, ' sren^2 mue^4, ' sr^2 ma^4, ' sr^2 mue^4 / ' what '; / cem^3 / ~ / ceme^3 / ~ (reading-pronunciations) / ' cen^3 ma^4, ' cen^3 mue^4 / ' how.'

9. Residual Structure: Determined Features. The statements of arrangement just made were based on the assumption that features or bundles of features represented in the transcription by single letters (or the digraph " ng ") occur only in linear sequence (§ 8, beginning). As we proceed with the presentation of determined features, we also indicate at what points that assumption was false.

9. 1. Features Dependent on Placement.

9. 11. Release and Onset. Consonants initial in a microsegment have distinctive release; final in a microsegment, distinctive onset; medial in a disyllabic microsegment (position [4′]), both.

→ / l / is now completely described. Examples: / lau^3 / ' always,' / tulu^1 / (?) ' cluster.'[22]

→ / m / is completely described on the addition of the following: the simultaneous occurrence of determining features **p** and **N** involves, as a determined feature, complete closure, the alternant possibility covered by the definition of **N** (approximation) being eliminated. Examples: / ma^3 / ' horse,' / tham^1 / ' they,' / sreme^2 / ' what.'

9. 12. Voicing and Voicelessness. Microsegments are voiced throughout unless they begin with / p t k c ph th kh ch f s h a /. Microsegments beginning with one of these are voiced except for an initial voiceless phase (the phase indicated by the symbols listed), except as follows: Initial / p t k c / are usually voiced in an unstressed microsegment, rarely elsewhere. / a / in initial position often has a glottal stop onset (constituting an initial voiceless phase); this is rarer in unstressed microsegments.

→ / p t k ph th kh f h / are now completely described. Examples: / pau^4 / ' newspaper,' / ' la^3 pa / ' trumpet '; / ta^4 / ' large,' / ' ue^3 te / ' my '; / kau^1 / ' high,' / ' i^2 ke / ' one '; / phau^3 / ' run '; / than^2 / ' converse '; / khai^1 / ' open '; / fan^4 / ' food '; / he^1 / ' drink.'

9. 13. Peaks of Sonority. By definition, one peak of sonority occurs in each monosyllabic microsegment, two in each disyllabic microsegment.

If a monosyllabic microsegment contains a vowel, there is a peak of sonority simultaneous with the vowel. If it contains no vowel, but contains a semivowel / i u / or the cluster / iu / in position [2], there is a peak of sonority simultaneous with the / i / or / u / or with the second phase of the cluster / iu /. If it contains no vowel and no semivowel / i u /, the peak of sonority is simultaneous with the last phase of the micro-

[21] Yuenren Chao discussed such fast-speech forms in a talk to the Yale Linguistics Club c. 1943.

[22] Beginning here, we mark with an arrow each paragraph which concludes the discussion of one or more vowels or consonants.

segment, whatever it may be (e. g., with the / r / of / sr⁴/ 'is,' with the terminal vocalic phase [§ 9. 2] of / s⁴/ 'four').

The major peak of sonority in a disyllabic microsegment is simultaneous with a vowel or semivowel in position [3] or [2], as the case may be. The minor peak is simultaneous with the element / e i u r / in position [5].

9. 2. The Semiconsonants. / c / or / s / as the only residual constituent of a microsegment has two successive phases. Phase one is, in each case, consonantal (simultaneous bundle of **c** and **S**, or of **c** and **F**), with the added determined feature of lowering of the central part of the tongue, raising of the dorsal part, and often some tension of the throat muscles. The second phase is vocalic, identical for / c / and / s /, and composed entirely of determined features: an unrounded high back vowel, with tongue as for the consonantal phase and the throat muscles still tense. Examples: / c⁴/ 'word,' / s⁴/ 'four.'

When the only residual constituent of a microsegment is / ch /, / c / has the two phases just described, but the / h / falls between them, after the consonantal phase of / c / and before the vocalic phase; the determined features of tongue-position and throat tension are maintained during the / h /: / ch⁴/ 'time, occurrence.'

In all other circumstances, / c, s / have only a single phase. When this phase is not simultaneous with palatalization or retroflexion (§ 9. 3), the tongue position is as described above.

→/ c ch s / are now completely described.

9. 3. / i u r / **not in Position** [4]. We take up separately / i u iu / in position [2] and / r / in position [1] or in the [1]-clusters / cr chr sr /.

9. 31. / i /. In the arrangement symbolized / CiV / ("C" = consonant, "V" = vowel), our assumption of linearity is false. The / i / begins at the beginning of the microsegment, as palatalization of the consonant, and continues after the consonant as a high-front-unrounded glide. The palatalization of the consonant is clearest in the case of / c ch s /; these consonants with palatalization are articulated with the tip of the tongue behind the lower teeth, the frontal surface of the tongue in contact with the upper teeth and the alveolar ridge to produce the closure or friction. Examples: / siang³/ 'think,' / chiau²/ 'bridge,' / bian¹/ 'side.'

In the arrangement / Ci / (no vowel), / i / begins with the consonant as palatalization (as above), continues after the consonant optionally as high-front-unrounded glide, then in all cases as high-front-unrounded vowel simultaneous with the peak of sonority. If / n / follows, the glide phase is usually present, and the vocalic phase is lower than otherwise. Examples: / si¹/ 'west,' / sing¹/ 'star,' / sin¹/ 'new,' / phin¹/ 'to spell out.'

In the arrangement / iV / (no initial consonant), / i / is a high-front-unrounded glide (and our assumption of linearity is correct): / iang²/ 'ocean,' / ian¹/ 'smoke.'

In the arrangement / i / (no initial consonant and no vowel), / i / begins as a high-front-unrounded glide and continues as a high-front unrounded vowel simultaneous with the peak of sonority. The vowel is slightly lower if / n / follows than otherwise. / i¹/ 'one,' / in¹/ 'sound,' / ing¹/ 'should.'

9. 32. / u /. All cases of / u /, save when / i / overlaps (§ 9. 33), add high-back tongue position as a determined feature.

In the arrangements / (C)uV/, / u / is a high-back-rounded glide: / uan³/ 'bowl' / kuan¹/ 'officer.'

In the arrangement / Cu /, / u / is a high-back-rounded vowel: / phu⁴/ 'store,' / tung¹/ 'east.'

In the arrangement / u /, / u / begins as a high-back-rounded glide and continues as a high-back-rounded vowel: / u³/ 'five,' / ur¹/ '(small) room.'

9. 33. / iu /. (1) When / ng / follows immediately, / i / has the varieties described in § 9. 32 for the arrangements / CiV/ and / iV/, and the / u / is a high-back-rounded vowel: / siung¹/ 'fierce,' / iung⁴/ 'use.'

(2) When / ng / does not follow immediately, four cases must be distinguished as for / i / alone:

In the arrangement / CiuV/, / i / begins with the consonant as palatalization thereof, / u / begins after the consonant, the / i / continuing, the two together constituting a high-front-rounded glide: / chiuan²/ 'together.'

In the arrangement / Ciu /, / i / begins with the consonant as palatalization; / u / begins after the consonant, the / i / continuing, the combination constituting (a) if / n / follows, a high-front-

rounded glide followed by a slightly lower high-front-rounded vowel; (b) otherwise, just a high-front-rounded vowel: / ciun^1 / 'army,' / chiu^4 / 'to go.'

In the arrangement / iuV /, / i / begins first, as high-front-unrounded glide; then the / u / begins, the / i / continuing, the combination forming a high-front-rounded glide: / iuan^4 / 'court,' / iue^4 / 'month.'

In the arrangement / iu /, / i / begins first, as high-front-unrounded glide; then the / u / begins as the / i / continues, the combination constituting (a) if / n / follows, a high-front-rounded glide followed by a slightly lower high-front-rounded vowel; (b) otherwise, just a high-front-rounded vowel: / iun^4 / 'to ship,' / iu^3 / 'rain.'

9.34. / r /. In the arrangements / CrV / and / Cru /, / r / begins and ends with the consonant, as retroflexion thereof. The consonants / c ch s / with simultaneous / r / have as position of articulation, therefore, the tongue retracted and lifted to the roof of the mouth, so that the tip is behind the alveolar ridge, the contact being between an area of the tongue including tip and blade and the roof of the mouth behind the alveolar ridge. Examples: / chru^1 / 'exit,' / srau^3 / 'few.'

In the arrangement / Cr / (with no vowel nor following / u /), / r / begins with the consonant as retroflexion thereof (as above), and continues after the consonant as retroflex vowel simultaneous with the peak of sonority. The tongue position for the vowel is identical with the position described above for / c ch s / with simultaneous / r /. Examples: / cr^3 / 'point,' / chr^1 / 'eat,' / sr^4 / 'is.'

In the arrangements / rV / and / ru /, / r / is a retroflex glide, often with some friction: / re^4 / 'hot,' / ru^4 / 'enter.'

In the arrangement / r / (no consonant and nothing following), / r / begins as a fricative retroflex glide and continues as retroflex vowel simultaneous with the peak of sonority: / r^4 / 'day, sun' (bound form).

9.4. Position [4]. / m / has already been covered in this position and elsewhere (§ 9.11). The remaining elements in position [4] are discussed in the order / i u n ng r ir ngr ur /.

/ i / is a glide towards (not necessarily to) the high front tongue position: / hai^3 / 'sea,' / kei^3 / 'give.'

/ u / is a glide towards (not necessarily to) the high back tongue position with concomitant increasing lip rounding: / hau^3 / 'OK,' / keu^3 / 'dog.'

/ n / is motion of the tongue to or towards the apico-alveolar position, with concomitant nasalization. If the following microsegment in the same mesosegment begins with / i /, the apico-dental closure is often not completed; in this case the nasalization begins with the peak of sonority or even immediately after an initial consonant, if any: thus in / ' man^4 i ˌ tian / 'a little shower.' If the following microsegment in the same mesosegment begins with / p ph m /, the closure of the lips for that consonant is often made simultaneously with the final / n / of the preceding microsegment; similarly for the dorso-velar closure for an initial / k kh h / of a following microsegment. Because the features constituting / n / are still present, this is not a morphophonemic replacement of / n / by / m / and / ng /. Thus: /ˌ chian^1 ' pi^3 / 'pencil,' / ' nuan^3 he / 'warm.' [22a]

/ ng / in this position involves no determined features: /ˌ pang^1 ' mang^2 / 'to give help.'

/ r / is a glide to the retroflex position, frictionless, the tongue approaching the roof of the mouth less closely than for / r / in other positions: / far^2 / 'method,' / ier^4 / 'leaf,' / her^2 / 'small box,' / uer^1 / 'nest.'

/ ir /: the / i / and / r / are simultaneous, constituting a glide to palatalized retroflex position: the front and central portions of the tongue are raised, and the tip slightly curled: / tiair^3 / 'a little,' / tieir^3 / 'bottom.'

/ ngr /: the nasalization begins with the peak of sonority, or even immediately after an initial consonant, if any. After the peak of sonority there are, simultaneously, a glide of the front part of the tongue to the retroflex position (as with / r / alone in [4]), and motion of the dorsal part of the tongue towards, but not to, contact with the velum; the nasalization increases through-

[22a] Perhaps rigor would require that we say, rather, that in such cases one has simultaneously / n / and / m /, or / n / and / ng /—that is if simultaneous **p** and **N** constitute / m /, and simultaneous **t** and **N** constitute / n /, perhaps simultaneous **p**, **t**, and **N** must be interpreted as simultaneous / n / and / m /. But the **p** or **k** in such cases is a long component, stretching back across microjuncture from the following microsegment.

out. Examples: /hengr²/ 'horizontal stroke,' /piengr³/ 'cake.'

/ur/ is a combination of /u/ and /r/, each as described above for position [4]; the two glides come in any arrangement relative to each other—/u/ first, /r/ first, simultaneous, or overlapping with either starting first: /phaur⁴/ 'bulb'[23]

→/i u r/ are now completely described;[24] /n ng/ are completely described once we add that, save as specified above, /n, ng/ involve closure, not approximation. There remain to be treated only the vowels, /e a/.

9. 5. Vowels. Microsegments with otherwise identical residual structure (as here analyzed) often occur in triads, in which a prominent feature of the contrasts between them is the height of the tongue at the peak of sonority. Thus: /i¹ : ie¹ : ia¹/ 'one : coconut : to press down,' /u³ : ue³ : ua³/ 'five : I : tile,' /c³ : ce² : ca²/ 'purple : duty : variegated.' Sometimes there are only two terms: /in¹ : ian¹/ 'sound : smoke' /tuen⁴ : tuan⁴/ 'ton : segment.' And sometimes there is only one: /iung⁴/ 'use.'

Vowel-sounds at the peaks of sonority of such microsegments differ in more than tongue-height: that of /ie¹/ is front, that of /ue³/ is back and rounded. The vowel-sound at a peak of sonority in some cases has several simultaneous components. For high vowel-sounds, the only components are parts of determining features written with symbols other than /e a/; thus in /i¹/ 'one,' /u³/ 'five,' /chr¹/ 'eat,' /c⁴/ 'word,' /iu³/ 'rain,' and the like (§ 9. 2-3). In other cases, such components are often present, but there is in addition the component of mid or low tongue-height, symbolized by /e a/. For example, the mid-front-unrounded vowel-sound of /ie¹/ has two components: the front position is part of /i/, the mid tongue-height is the /e/; the mid-back-rounded vowel-sound of /ue³/ has three components: the roundedness is part of /u/, the mid tongue-height is the /e/, and the back position is a determined feature occurrent whenever this concatenation of determining features is found.

In what follows statements of the kind just made are greatly abbreviated: when nothing is said to the contrary, /e/ (plus whatever other simultaneous components may be involved) is to be taken as having its "normal" value, mid-back-unrounded; /a/, similarly, its "normal" value low-central-unrounded.

9. 51. Triads. Three-way contrasts occur in the following frames ("C" = consonant, #, or a cluster /cr chr sr/; "V" = /# e a/): /CV#, CuV#, CuVr, CuVng, CuVngr, CiV#/.

/CV#/: /e/ has its normal value or, optionally, is a glide downwards and forwards from a fairly high back position, the peak of sonority near the beginning of the glide. /cre¹ : cra¹/ 'to cover up : to jab.'

/CuV#, CuVr/: /e/ is rounded (otherwise "normal"), often with a glide after the peak of sonority towards mid-central-unrounded. /a/ is sometimes slightly retracted and rounded. /ue¹ : ua¹/ 'nest: to vomit,' /ˌsiau³ ˈuer¹, /ˌsiau³ ˈuar⁴/ 'small nest : small stockings.'

/CuVng, CuVngr/: /a/ is often a bit retracted and rounded: /ueng¹ : uang²/ (surnames), /khuangr¹/ 'basket.'

/CiV#/: /e/ is mid-front-unrounded, often with a centering glide after the peak of sonority; /a/ is sometimes slightly fronted: /ie¹ : ia¹/ 'coconut : duck.'

9.52. Pairs. Two-way contrasts occur as follows:

9. 521. /e/ versus /a/, in frames /CVr, CVi, CVir, CVn, CVng, CVngr, CVur, CVm, CuVi, CuVir, CuVn, CiVngr, CiVu, CiVur, CiVr, CiVir/.

/CVr/: as in frame /CV#/: /chrar¹ : ˌsiau³ ˈchrer¹/ 'X-mark : small cart.'

/CVi/: /e/ is mid-front-unrounded; /a/ slightly fronted and raised: /kei³ : kai³/ 'to give : to alter.'

/CVir, CVn/: /e/ higher-mid-central-unrounded, even more fronted in the specific frames /rVn, rVir/; /a/ is slightly fronted and raised: /keir¹ : kair¹/ 'root : dried stuff,' /cren⁴ : cran⁴/ 'to give relief : to stand,' /ren²/ 'people.'

/CVng, CVngr/: /a/ is often a bit retracted. /reng¹ : rang³/ 'to throw : to call out,' /fengr¹ : fangr²/ 'small envelope : small house.'

/CVu, CVur/: both /e/ and /a/ are optionally rounded, /e/ usually so; /a/ is

[23] Hartman, loc. cit., fn. 14, suggests a possible contrast of terminal /ru/ and /ur/ postvocalically, but I have not heard any.

[24] Except for phrases simultaneous with /e/ or /a/, discussed in § 9.5.

optionally a bit retracted: /keu³ : kau³/ 'dog : pick (tool),' /t..r¹ : taur¹/ 'pocket : small knife.'

/CVm/: /e/ is slightly fronted: /srem² : tham¹/ 'what : they.'

/CuVi/: with /k kh h cr chr sr r #/ in position [1], /e/ is higher-mid-central-unrounded; with anything else in [1], higher-mid-back-rounded: /kuei¹ : 'kuai¹ ta/ 'to pertain to : to pat with a flat instrument,' /tuei⁴/ 'correct.'

/CuVir/: both /e/ and /a/ are fronted and raised: /tueir¹ : tuair⁴/ 'pile, heap : segment.'

/CuVn/: with # as [1], /e/ is slightly fronted; otherwise, /e/ is raised, almost to a (lax) high-back position, and rounded. /a/ is slightly fronted and raised. /tuen⁴ : tuan⁴/ 'pause : segment.'

/CiVngr/: /e/ is higher-mid-central-unrounded: /piengr³ : iangr⁴/ 'cake : manner.'

/CiVu, CiVur/: with tones /¹ ²/, /e/ is raised and optionally rounded; with tones /³ ⁴ ⁵/, not raised but optionally rounded; toneless, between these two. /a/, with tone /¹ ²/ and with /c ch s/ in position [1], is markedly raised and retracted, usually with rounding. Examples: /ieu¹ : iau¹/ 'to swing : waist,' /siau¹/ 'flute,' /chieur² : chiaur²/ 'ball : bridge.'

/CiVr/: as in frame /CiV#/: /ier⁴ : iar²/ 'leaf : seedling.'

/CiVir/: both /e/ and /a/ are fronted and raised: /tieir³ : tiair³/ 'bottom : a little.'

9.522. /#/ **versus** /e/, in frames /CiuV#, CiuVr/: as in frames /CiV#/ or /CiVr/: /ciue²/ 'to dig,' /siau⁵ 'siuer³/ (?) 'light fall of snow.'

9.523. /#/ **versus** /a/, in frames /CiVn, CiVng, CiuVn/.

/CiVn/: /a/ is raised and fronted radically, almost a lower-mid-front-unrounded vowel-sound: /tian³/ 'a bit.'

/CiVng/: /siang⁴/ 'towards.'

/CiuVn/: /a/ varies between its normal value, and low-front-unrounded: /iuan³/ 'far away.'

9.53. Unpaired Items. In the following frames there are no contrasts: with /#/: /CiVm, CiuVng, CiuVngr/; with /e/: /CuVm/; with /a/: /CiuVir/.

/CuVm/: /e/ is rounded: /uem³/ 'we.'

/CiuVir/: /a/ is slightly fronted and raised: /hua¹ 'iuair²/ 'flower garden.'

9.54. Unstressed and Disyllabic Microsegments. Unstressed monosyllabic microsegments are in general the same in their residual characteristics as those bearing stress. However, final /e/ in an unstressed monosyllabic microsegment, and /e/ in position [5] of disyllabic microsegments, are centered and lowered, and alternate freely with a slightly raised variety of /a/. In unstressed monosyllabic microsegments, though not in position [5] of disyllabic microsegments, there is a morphophonemically distinct /a/ (slightly raised) which does not alternate with /e/. The transcription is on this score morphophonemic: /'ceme³ ne?/ 'What?!'; but /'kuai¹ ta/ 'to pat with a flat instrument.'

In position [3] of a disyllabic microsegment, /e/ has the same quality that it has with the same elements in position [1] and [2], and /n/ in position [4], in a monosyllabic microsegment: /sreme² : ceme³/ 'what, how.'

→/a, e/ are now completely described.

9.55. Alternative Treatments. Our analysis above selects in a few cases one rather than the other of two apparently equally acceptable choices, the reasons for our choice being irrelevant to the phonological facts:

In the frame /CiVn/, the vowel quality interpreted as /a/ has higher tongue-position than any other vowel quality so interpreted; there is no contrasting /e/ in this frame, and the vowel quality in question could also be interpreted as /e/; e.g., /tien³/ 'a little,' instead of /tian³/. This alternative choice is reflected in the Wade Romanization.

In the frames /CuVi, CuVir, CiVu, CiVur/, and in frame /CuVn/ when C is not zero, only /e/ and /a/ occur. The vowel qualities interpreted as /e/ are quite high, and could also be interpreted as zero; thus /kui⁴/ for our /kuei⁴/ 'expensive,' /khuir³/ for /khueir³/ 'spool,' /iu²/ for /ieu²/ 'oil,' /chiur²/ for /chieur²/ 'ball,' and /tun⁴/ for /tuen⁴/ 'pause.' /uen⁴/ 'to ask' would not be altered, for in this case the vowel quality is clearly in the mid tongue-height range. Since the symbolism /iu/ would thus become ambiguous for our present /iu/ (as in /iu³/ 'rain') and /ieu/, another orthographic convention would have to be introduced: simultaneous or overlapping /i/ (**i**) and /u/ (**u**) would have

to be written with a single symbol, say / y /, giving / iu³/ 'to have,' / y³/ 'rain.'[25]

Had the alternative choices been made in these cases, the arrangement of our descriptive statements would have been modified slightly; neither this nor the necessity of introducing / y / militates against this treatment.

10. Limitations on Sequence of Microsegments. A microsegment with initial / ng / occurs only in macrosegment-final, preceded in the same mesosegment by a microsegment ending in / ng /: /, lau³ 'uang² nge?/ 'O friend Wang!'

Within a macrosegment: the third tone does not occur on two successive microsegments; neither does the fifth tone; the fifth tone does not fall on the terminal microsegment; a mesosegment with an initial pretonic toneless and stressless microsegment does not occur initially.

11. Comparison with Hartman's Analysis. The formulation just completed above of Peiping phonology is based on and supported by the writer's own observations; but both observations and formulation were guided by the work of predecessors. In the late thirties George L. Trager, working with George A. Kennedy, developed the theories of: three basic vowels (high, mid, low); the biphonemic status (/ iu / in our notation) of high-front-rounded vowels or glides; and the analysis of retroflex initials / sr cr chr / into non-retroflex initials / s c ch / and a retroflex semivowel / r /. The results were not published by either Trager or Kennedy; Hartman later took up the investigation, carried it further, and published.[26] The present analysis is also, so to speak, in the same "tradition"; but there are differences, and these differences are worth discussion.

(1) Hartman posits three vowels, / a e / and high / i /; he writes the semivowels as / j w r /. To each syllable one of these three vowels is assigned.[27] Monosyllabic microsegments which here are taken as having no vowel at all are by Hartman taken to contain the high vowel. Thus he writes / njwi / for our / niu /, and so on.

It turns out, upon inspection, that if Hartman's high vowel is omitted, the remaining set of symbols with which such a microsegment is written, together with the fact that they constitute a single microsegment, defines unambiguously both the location of the peak of sonority and the vowel-quality which occurs there. It is therefore redundant to indicate, with a separate symbol, the location and high-vowel nature of the peak of sonority in such microsegments.

Of paramount importance in the statement just made are the words "together with the fact that they constitute a single microsegment." Hartman assumes this fact, not discussing (save in one footnote) phenomena in sequences larger than a single monosyllabic microsegment. Until such phenomena have been observed, however, we cannot know for sure whether Hartman's "syllable," the structure of which is his topic, is a unit defined phonologically by the fact that it has a peak of sonority, or by the fact that a phonemically relevant syllable-juncture occurs between each two successive syllables. If the former should turn out to be the case, then the presence of a peak of sonority is necessarily a primary factor (a determining feature, in our terminology); but if the latter is the case, then at least so long as we confine our attention to *monosyllabic* microsegments (as Hartman did), the present of a peak of sonority is not a primary factor, but a resultant of the arrangement of other factors. Furthermore, if the former is the case, we cannot legitimately discuss segmental structure in terms of "syllables," but must instead take as our larger units, within which certain arrangements of features occur, whatever unit happens to be marked off by successive occurrences of the closest phonemic variety of open juncture—perhaps, for example, whole phrases.

Within Hartman's range of discussion, therefore, with arrangement of material within what we here call monosyllabic microsegments as the topic, the high vowel, the "syllabicity" vowel with no other distinguishing characteristic of its own, is clearly a resultant rather than a determining feature in its own right. In the present discussion we have explicitly introduced the determining feature (microjuncture) which enables us to discuss arrangement of material within microsegments,

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[25] This alternative was suggested by Morris Swadesh (private conversation).

[26] Loc. cit. (see fn. 2 above).

[27] Hartman's "syllable" = our "monosyllabic microsegment"; Hartman, like his predecessors, does not discover disyllabic microsegments, and does not examine too closely the problem of establishing syllables as phonologically relevant units to start with.

and are led a fortiori to exclude the high vowel as a separate entity. However, we also see that there are disyllabic microsegments, not discussed by Hartman, the structure of which must also be accounted for in our complete analysis. It might have turned out, quite easily, that in this special and rare type of microsegment the high vowel would be necessary; and, if that had been the case, it would of course have had to be used throughout. Since disyllabic microsegments are hard to observe, further familiarity with allegro speech may still necessitate a return from the two-vowel system to Hartman's, but at the present writing this does not seem likely.

(2) Hartman reports a smaller variety of finals containing / r / than are recognized herein. Thus he recognizes the contrast here transcribed as / eir / versus / er /, providing the microsegment bears first or second tone, but not with any of the other tones, and no comparable distinction between / air / and / ar /. This, of course, may well be the situation for some speakers.

Hartman's analysis of / eir / and / er / takes the first as / er /, the second as / eer /, with the mid vowel doubled; this is based on a reputed difference in length of the vocalic phase of the final, which he takes, instead of the qualitative difference, as primary. This could be extended to the cases he does not distinguish: / eer, er; aer, ar /, respectively, with all tones, instead of my / er, eir; ar, air /. There is perhaps little basis for choice; I hear distinct palatalization in the second of each pair, and have interpreted accordingly.

(3) Hartman, § 7, says "there is . . . nothing in the distribution to suggest that the aspirates [/ ph th ch kh /] are anything but unit consonants." Here our phonemic working assumptions differ; Hartman is analyzing occurrent material into phonemes, I analyze into determining (and determined) features; Hartman uses distributional facts as the basis for phonemic conclusions, I find the determining features and then state the distributions. The aspiration of / ph th ch kh / *sounds* like the independent aspiration / h /; so I take it to be the same thing.

(4) Hartman does not, in his paper, recognize tone / ^{5} / ("raised third") as phonemically distinct; but it was Hartman who, after publication of his paper, discovered cases of minimal contrast which establish / ^{5} / as different from both / ^{2} / and / ^{3} /.

ADDENDA: Since this report was submitted several facts have come to light (mainly through the courtesy of Yuenren Chao) which bear on the discussion.

(1) (To § 8.23) The following monosyllabic microsegments, excluded in the text, are attested: /sen, seng, sengr, liun, nen, neu, tiang, tiangr, thei, pia, phia, chrei, rua/. /len/ occurs elsewhere than in the name referred to (§ 8.23, (5)). Many of the above additions are from onomatopoetic forms.

(2) (To §§ 9.31, 9.33) In the sequence /Ci. . ./, if /C/ is /t th n l/ the consonant is not palatalized; rather, the /i/ is a rather low high-front glide or vowel, not overlapping the consonant.

(3) There are a number of interjections having vocalic structure not subsumable under the system here set up. In addition, there is a minimum contrast between /,ieu^2 'cing^3/ 'oil wells' and what we would here transcribe identically in the meaning 'there are wells,' where the first syllable of the latter might also bear tone /^{5}/. /ieu^2/ in the first of this pair has a relatively high back rounded vowel; in the second of the pair, a considerably lower vowel (identical with that of /ieu^3/ or /ieu^4/). In the light of this phenomenon there is serious doubt as to whether the two-vowel system, or its three-vowel predecessor, can be maintained. Perhaps it can, if we accept the modification suggested in § 9.55, writing /ieu^1 ieu^2 'swing, oil,' and /ieu^2 ieu^5 ieu^3, ieu^4/ for 'there is [three forms], again.'

A COPTIC SOLAR ECLIPSE RECORD[1]

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1. *Introduction.*

The following Coptic solar eclipse record is found on an ostracon in the Egyptian Museum at Turin. It has been published, with a translation, by L. Stern[2] and F. Rossi.[3] The text has been

[1] The writer is indebted to Professor O. Neugebauer for several suggestions and references.

[2] L. Stern, *Sahidische Inschriften*, Zeitschrift für Ägyptische Sprache und Alterthumskunde, 16th Jahrgang, 1878, page 11. For the loan of this journal, the writer is indebted to the Colgate-Rochester Divinity School Library and to Mr. E. A. Chapman, librarian at Rensselaer.

[3] F. Rossi, *Di alcuni cocci copti del museo Egizio di*

published also by Mallon.[4] None of these authors has attempted to determine the eclipse to which the text refers although Stern, in discussing the date of the record, mentions that an identification of the eclipse is needed to actually date the inscription.

This paper gives the Coptic text and a translation. The text was taken from Mallon and checked with Stern and Rossi. The translation was made independently and then compared with that of Stern and Rossi. Further, this paper identifies the eclipse recorded in the text.

2. *The Text and Translation.*

The Coptic text and translation follow:

Text: ϩⲛ̅ ⲥⲟⲩ ⲙ̅ⲛ̅ⲧⲁϥⲧⲉ ⲙ̄ ⲫⲁⲙⲉ-ⲛⲱⲑ ⲧⲏⲥ ⲧⲉⲧⲁⲣⲧⲏⲥ ⲓⲛⲇⲓⲕ ⲇ ⲡⲣⲏ ⲣ̅ⲕⲁⲕⲉ ⲛ̄ ⲭ̅ⲡ̅ ϥⲧⲟ ⲙ̄ ⲡⲉϩⲟⲟⲩ ⲁⲩⲱ ϩⲛ̅ ⲧⲉⲣⲟⲙⲡⲉ ⲉⲧⲉⲣⲉ ⲡⲉⲧⲣⲟⲥ ⲙ̄ ⲡⲁⲗⲟⲩ ⲟ ⲛ̄ⲗⲁⲫⲁⲛⲉ ⲉ ϫⲏⲙⲉ ⲛ̄ϩⲏⲧⲥ.

Translation: On the fourteenth of Phamenōth of the fourth indiction, the sun was eclipsed in the fourth hour of the day and in the year in which Peter, son of Palu, was made village official [5] in Djēme.[6]

3. *The Coptic Calendar.*

The Coptic year was composed of twelve months of thirty days each plus a short month of five days in an ordinary year and of six days in a leap year. The Coptic year has been discussed by Ginzel,[7] Chaine,[8] Tuki [9] and Mallon.[10] It started ordinarily on August 29 in the Julian calendar but, in the year which followed the Coptic leap year, it began on August 30. Ginzel [11] further states that the year began on August 30 in every Julian year which, when divided by 4, gives a remainder of 3.

4. *Remarks on the Information of the Text.*

It will be noted that the eclipse occurred on the 14th of the Coptic month Phamenōth. Since Phamenōth is the seventh Coptic month and since the Coptic year began as noted in the previous section, an easy computation shows that the eclipse must have occurred on March 10.[12]

An indication of the year of the eclipse is furnished by the reference to the village of Djēme.[13] Budge [14] has discussed the location of Djēme and identified it with the modern town of Madīnat Habū (Medīnet Habū) near ancient Thebes. He further states that a wealthy Coptic colony was located there in the 5th and 6th centuries of the Christian era. Hence, it seemed likely that the eclipse, to which the text refers, occurred on March 10 near these two centuries. Using this fact, the eclipse of 601, March 10, number 4307 in Oppolzer,[15] was chosen as a good possibility. This eclipse was total and its path of totality passed through Egypt.[16]

The particular indiction is not given but it is stated that the eclipse occurred in the 4th year of an indiction. An indiction is a period of 15 years starting either A. D. 297 or 312.[17] Since these two dates are exactly 15 years = 1 indiction apart and since only the year in an indiction

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Torino, Atti della R. Acad. delle Scienze di Torino, XXX, Disp. 14a, Torino, 1895, page 801. For the loan of this journal, the writer is indebted to the University of Rochester Library.

[4] A. Mallon, *Grammaire Copte avec Bibliographie, Chrestomathie et Vocabulaire*, 3rd edition, Beyrouth, 1926, page 131.

[5] Mallon, *loc. cit.*, vocabulary, gives translation as chef, supérieure; W. C. Crum, *A Coptic Dictionary*, Oxford, 1939, gives village magistrate or official, doubtful if a priestly title; A. Peyron, *Lexicon Linguae Copticae*, Berlin, 1896, gives magister pagi.

[6] Mallon, *loc. cit.*, vocabulary, gives meaning as name of a mountain or a monastery.

[7] F. K. Ginzel, *Handbuch der mathematischen und technischen Chronologie*, Leipzig, 1906-1914, Vol. III, pp. 321-326. This book was obtained through the courtesy of Brown University Library.

[8] M. Chaine, *La Chronologie des Temps Chrétiens de l'Égypte et de l'Éthiopie*, Paris, 1925, pp. 73-102.

[9] R. Tuki, *Rudimenta Linguae Coptae sive Aegyptiacae*, Rome, 1778, pp. 391-396.

[10] A. Mallon, *loc. cit.*, pp. 82-84.

[11] F. K. Ginzel, *loc. cit.*, p. 321.

[12] See also M. Chaine, *loc. cit.*, pp. 85, 86.

[13] For the etymology of this name, see U. Hölscher, *The Excavation of Medinet Habu*, Vol. II, Chicago, Oriental Institute Publication XLI, 1939, p. 43. This book was obtained through the courtesy of the University of Cincinnati Library.

[14] E. A. W. Budge, *Coptic Apocrypha in the Dialect of Upper Egypt*, British Museum, 1913, p. 280.

[15] Th. v. Oppolzer, *Canon der Finsternisse*, Wien, 1887, reprinted by Stechert, New York, 1921.

[16] See also M. Chaine, *loc. cit.*, p. 271.

[17] *Encyclopaedia Britannica*, 14th edition, article on chronology, Roman, and article on indiction.

period is required, either starting date may be used to check the eclipse chosen. The year of the indiction for the eclipse of 601, March 10, is

$$\frac{601-297}{15} = \frac{304}{15} = 20\ \frac{4}{15}\ .$$

Hence, this eclipse occurred in the 4th year of an indiction, as required by the text.[18]

In order not to overlook any other eclipse which might satisfy the text, all the eclipses, occurring on March 10, were noted in Oppolzer for the years from 297 to 1580 of our era. All except that of 601, March 10, failed to satisfy the requirements of the text with respect to one or more of the following points: the eclipse must be total, the path of totality must pass near mid-Egypt, the year of the indiction must be the fourth.

The final step in this investigation is to compute, for the eclipse of 601, March 10, whether the sun is enough obscured at Thebes to be noticeable to the inhabitants and whether the greatest obscuration occurred during the 4th hour of the day.

5. *Results of Computations of the Eclipse of 601, March 10.*

The computations were made by the methods given in P. V. Neugebauer, *Astronomische Chronologie,* Berlin and Leipzig, 1929. The elements of the 601, March 10, eclipse, with the exception of Neugebauer's [19] L, were taken from Schroeter.[20] The value of L was computed using P. V. Neugebauer, *Tafeln zur astronomischen Chronologie,* Volume II, Leipzig, 1914, with the corrections from Table E1.[21] The longitude (λ) and latitude (ϕ) of Thebes (Egypt) are given as $\lambda = +32.6°$, $\phi = +25.7°$ by Neugebauer.[22]

The computations will not be given here. However, they show that Thebes was south of the path of totality of the eclipse and that the maximum obscuration of the sun was 10.6 twelfths of the diameter of the sun's disc. This was large enough for the resulting darkness to be perceptible to the inhabitants. The time of this greatest phase was $10^h\ 02.4^m$ Thebes time (a. m.). The eclipse began at $8^h\ 38.4^m$ and ended at $11^h\ 42.4^m$ Thebes time (a. m.). Since the sun rose at $6^h\ 08^m$ and set at $17^h\ 52^m$, Thebes time, on that day, the entire eclipse was visible.

These computations make it possible to check whether the eclipse took place in the fourth hour of the day. Although many nations of the Middle East started their day at sunset, it is clear that the text does not refer to a day starting then because the fourth hour would then occur at a time when the sun was below the horizon at Thebes. Consequently, the record must refer to the fourth hour of daylight and, since the sun rose at $6^h\ 08^m$ on the day in question, the fourth hour must be counted from approximately this time at Thebes. Further, it is unlikely that the text refers to any scientific observation of the eclipse but rather to a time when the obscuration of the sun's light was particularly noticeable. This would be at the time of maximum phase of the eclipse and the record undoubtedly refers to this time, namely $10^h\ 02.4^m$, or to some short time just preceding. But this time does lie in the fourth hour, starting at $6^h\ 08^m$ a. m., and so the eclipse of 601, March 10, satisfies this final condition of the text as well as the other conditions.

6. *Conclusion.*

The previous discussion shows that the Coptic text, as given in this paper, is a record of the solar eclipse of 601, March 10, of the Christian era.

[18] See also M. Chaine, *loc. cit.*, p. 146.

[19] P. V. Neugebauer, *Astr. Chron.*, Vol. I, p. 113.

[20] J. F. Schroeter, *Spezieller Kanon der zentralen Sonnen- und Mondfinsternisse, welche innerhalb des Zeitraums von 600 bis 1800 n. Chr. in Europa sichtbar waren,* Kristiania, 1923, p. 2. This book was obtained through the courtesy of the New York State Library.

[21] P. V. Neugebauer, *Astr. Chron.*, Vol. II, p. 3.

[22] P. V. Neugebauer, *Astr. Chron.*, Vol. II, Table E101, p. 133.

ṚG-VEDA 10.27.14: *bṛhánn achāyó apalāśó árvā*[1]

MURRAY FOWLER

THE OPENING WORDS of RV 10.27.24, *bṛhánn achāyó apalāśó árvā,* seem to describe a horse as great (or high), shadeless, and leafless. Translators, as might be expected, have generally been bothered by this conjunction of ideas so foreign to modern modes of thought. Griffith supplies the word 'heaven,' translating *arvā* as 'swift': 'high, leafless, shadowless, and swift is heaven.' Ludwig likewise: 'hoch, schattenlos, laublos, beweglich ist der himel'; and he defends his choice in a characteristic note: ". . . unrichtig muss *arvā* sein, da ein vernunftiger mensch doch wohl von einem laublosem ross nicht sprechen kann." Both Geldner and Oldenberg omit comment on the passage, and the stanza is not considered in Pischel and Geldner's *Vedische Studien.* Grassmann, however, assumes that *arvā* is correct, and that the *arvā* is Agni: 'hoch is das Ross [Agni], doch ohne Schatten, ohne Laub.' He does not give his reasons; but he is probably correct.

These four words, *bṛhánn achāyó apalāśó árvā,* form a normal eleven-syllable verse in triṣṭubh meter: they are, therefore, a metrical unit. Syntactically, likewise, they hold together: the verse immediately following, *tastháu mātā́ víṣito atti gárbhaḥ,* 'the mother stands, the calf, released (or expelled), eats,' although itself in need of explanation, can be construed satisfactorily alone. Of the words to be considered, this is the only occurrence of two, *achāya* and *apalāśa,* in the Rig-Veda; related forms, however, are well attested, and the meaning of these negatives is, therefore, reasonably certain; since, moreover, they complement one another within the same image, there can be little doubt that they mean 'without shade' and 'without leaves.'[2] *Bṛhann* gives no difficulty: it is 'high' or 'great' or 'mighty'; the word is thus often used in the Rig-Veda. *Arvā,* likewise, although not without its problems, is clear enough. From its etymon it has the sense of 'swift-moving.' In the Rig-Veda it is most often the word for a running horse, or a racehorse; whereas *aśva* is merely 'horse.' The Brihadaranyaka Upanishad, it will be recalled, which opens with a description of the cosmic horse, mentions the incarnations of this *aśva medya*—among them, that of *arvā*: *hayo bhūtvā devān avahat,* 'having become a *haya,* it carried the *devas*'; *vājī gandharvān arvāsurān aśvo manuṣyān,* 'as a *vājī,* the Gandharvas, as an *arvā,* the Asuras, as an *aśva,* mankind.' If the evidence, therefore, is not quite precise enough—it is hard to know the exact distinction intended between each of these horses and the next—yet it is sufficient to support the translation of *arvā* as 'horse'; since, further, *arvā* embodies the idea of rapid motion, of progression, and of power, it may perhaps more specifically be rendered as 'steed' or 'courser.'

According to the meanings of the several words, then, we seem to have in *bṛhánn achāyó apalāśó árvā* something which is unmistakeably a great, shadeless, leafless steed. The image, indeed, is singular; but, except for that singularity, there is no reason at all for emendation of the verse. From the rest of the hymn, there is not much help to be had. Those who have not recently examined RV 10.27 may recall to mind some idea of its obscurity from the treatment given it by Grassmann: it is one of those concatenations of stanzas of which he has both rearranged the order and banished more than half to the appendix of his translation. Indeed, the whole hymn is so evidently cryptic and so very rich in imagery that even a dubious certainty can be attained only by a most careful analysis of each figure of the thought. It is to the image itself, therefore, that

[1] This paper was read on April 16, 1947, before the Middle East Group of the American Oriental Society, meeting in Washington, D. C. In order to take advantage of criticism and suggestions offered at that time, one paragraph, indicated by note 14, has been added.

[2] The clearest use of *chāyā* occurs in RV 6.16.38: *úpa chāyā́m iva ghṛ́ṇer áganma śárma te vayám,* 'as if from heat to shade we come to thy protection'; and every student of the Vedas will recall the figurative use of the same word in RV 10.121.2: *yásya chāyā́mṛ́taṃ yásya mṛtyúḥ . . .*' 'whose shadow is immortality and death.' For the sense of *palāśa* it will suffice to quote the well-known verse, RV 10.135.1, *yásmin vṛkṣé supalāśé devā́iḥ sampíbate yamáḥ,* 'that fair-leaved tree in which Yama drinks together with the gods.'

attention must be directed if the meaning is to be comprehended quite without distortion. The remainder of this study will, accordingly, be devoted to showing that the figure is, as it stands, probably as the poet conceived it, and that it is both precise and meaningful. Finally, an attempt will be made to interpret its significance.

The transition from a leafless horse to the *aśvattha,* the tree with the transparently equine name, is most natural, but it will be more valuable first to consider other members of the sacred wood. The ash of Yggdrasill, the world-tree in Norse tradition, appears in the earliest Eddic poems. For its identity, it will suffice to quote *Vǫluspá* 19,[3] the passage which begins

> Ask veit ek standa heitir Yggdrasill
> har baðmr . . .
> An ash I know standing called Yggdrasill
> a high tree . . .,

and which continues to describe the dews that fall from it, and the Norns who dwell beneath it, dealing life and fate to men. It is the world-tree; and it is certainly a *tree,* for in *Grímnismál* 29-35 it is again called an ash (*askr*), with roots (*roetr*) and branches (*kvisto*).

Now, however, as Snorri Sturluson twice reports in the Younger, or Prose, Edda,[4] Yggr is one of Othin's names. The evidence is to be found also in the Elder Edda, most clearly in *Grímnismál* 54:

> Oðinn ek nú heiti Yggr ek áðan hét
> Othin I am noy called; Yggr was I formerly called;

and again in *Hymiskviða* 2, where Thor, usually the son of Othin, is called *Yggs barn.*

Yggr, then, is a name of Othin. The etymology of the word need not detain us: it appears to mean, as a common adjective, 'terrible,' and is so used in the first stanza of *Atlamál in groenlenzko.*

That *drasill,* the second part of the compound, equals 'horse,' has long been recognized. Sophus Bugge[5] has discussed the matter at length. The word is a literary one: it is used twice only in the Elder Edda, both times in *Atlakviða in groenlenzka*—4, 4, and 32, 6. In the former passage *drǫsla mélgreypa,* 'champing steeds,' are listed among the gifts which await a visitor to Atli's hall; in the latter the poet describes the 'press of steeds,' *drǫslom of thrungit,* as Atli and his men ride clanging into the courtyard after a successful fight. *Drǫslom* here is the dative plural of *drasill.*

Yggdrasill, the world-tree, is, thus, the horse of Othin; and there exists in another Indo-European language, in a related tradition, a symbol of the world which is either itself both a horse and a tree or, if the name be more properly *Yggdrasills askr,* a tree of, or belonging to, a horse. In either case it is a horse-tree, a *hippodendron*; and it is, therefore, reasonable to suppose that the Vedic seer likewise intended to fuse into one image the two concepts of the world-horse and the world-tree.

Before returning once more to the Vedic text, there is something to be learned from other sacred trees. And first, for the matter of shadelessness, those in Greece. The precinct of Zeus on Mt. Lycaeus in Arcadia, as Pausanias[6] and Plutarch[7] both tell us, was remarkable in that no shadow was cast by anything at all—by trees, or by deer, or by man. This lack of shade, or its counterpart, eternal brightness, is a quality shared also by Mount Olympus, which, in the Odyssey, is cloudless (*ἀνέφελος*) and suffused in white radiance (*λευκὴ αἴγλη*).[8] Similar, if not precisely identical, is the shadelessness which in India and Persia is connected with divinity and deathlessness: the human Nala, it will be remembered, at his famous

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[3] Cf. also *Vǫluspá* 47, where the tree is called the ash of Yggdrasill: *Yggdrasills askr.* The genitive is likewise used in *Grímnismál.* All references to the Poetic Edda are to Gustav Neckel's edition: Carl Winter, Heidelberg, 1936.

[4] *Gylfaginning* XX; *Skáldskaparmál* LIII.

[5] Sophus Bugge: *Studien über die Entstehung der nordischen Götter und Heldensagen*; [German translation by] Oscar Brenner, München, 1889, p. 394, anm. 8; p. 395, anm. 2. Bugge's opinion (pp. 318, 427) (shared, at one time at least, by other scholars working rather too exclusively in Norse religion: cf. *Corpus Poeticum Boreale,* Gudbrand Vigfusson and F. York Powell, Vol. I, p. 480, and Vol. II, p. 460) that the whole concept of Othin's tree is directly due to Christian influence can hardly be correct. The parallel of Othin's horse and 'Jesus' palfrey' (see A. H. Sayce in *Academy,* 1882, pp. 398-9) is beautifully exact, but improbably a matter of influence. Crosses, like saviors, are not exclusively Christian.

[6] *Descriptio Graecae,* VIII.38.6.

[7] *Questiones Graecae,* 34. W. H. Halliday, in his edition of the Greek Questions, has correctly noted (173) that both in Greece [Pythagoras] and in India spirits are distinguished from mortal beings by their lack of shadow and their unwinking eyes.

[8] *Odyssey* VI.45.

meeting with Damayantī, being distinguished from the gods, by, among other characteristics, the presence of his shadow (*chāyādvitīyo*); and in the Avesta the sacred mountain having neither darkness nor night. A similar, and probably related, image is familiar to us all from the Psalms and from Job ('. . . the valley of the shadow of death'); and there can be no, or little, doubt that this figure, as used in Sanskrit, Greek, and Latin (*chāyā mṛtyuḥ*; *σκία θανατοῦ*; *umbra mortis*), has its origin in the common observation that whatever throws a shadow is corporeal, corruptible, and inevitably mortal.

No evidence remains to show that the most famous tree in ancient Greece, the oak of Zeus at Dodona, actually cast no shade. Indeed, it seems on the contrary to have been specifically a leafy tree; but it may have another point of resemblance to the *apalāśó árvā*. It was to the hypaethral shrine of this ancient oak that Odysseus went to learn the will of Zeus (*ἐκ δρυὸς ὑψικόμοιο Διὸς βουλὴν ἐπακούσαι*).[9] These words are important: it was not the tree at Dodona which the dios Odysseus went to see; it was not to the tree, but to the Word that Odysseus hearkened—as the excellent Strabo has it, he took counsel with Zeus (*συμβούλῳ τῷ Διὶ χρώμενος*).[10] Now, in his exhaustive study of the oak-god at Dodona,[11] Torgny Segerstedt has suggested that it was Zeus as *fire* that was worshipped in the wood at Dodona (as Agni *vanaspati* is revered as latent in the wood in India). The idea is a provocative one if we keep in mind the purpose of Odysseus: he went to Dodona to know the will of the Lord, in whose will, presumably, lay his peace. He did not go to Dodona to worship a tree.

Yet the symbol is necessary. And if the symbol be a traditional one, its traces are likely to be found all over the world, separated often by thousands of miles, quite beyond the reach of influence. Pausanias knew of the shadeless grove of Zeus in Arcadia; in the seventeenth century of our era another traveler, one Henry Lord, an English visitor to India, recorded an even more exact parallel to the *achāyó . . . árvā*. Parsees told him, he says,[12] 'of a tree called Holme . . . admired in this one particular as they affirme, for that the sunn of heaven giveth it no shadow.' There is the shadeless tree again: this time the Haoma plant.

There appears to be no evidence in the Zend-Avesta itself that the Haoma plant cast no shade. Darmesteter quotes Lord without comment. The belief, however, that Lord recorded, may be connected with the idea that Hara Berezaiti, or Hara Bereza,[13] on which Haoma was said to have offered the first sacrifice, is described as bright and cloudless, with neither night nor darkness. It is, therefore, in this respect similar to Mount Olympus, and to the grove of Lycaean Zeus, and to other places which may be thought to be not 'beneath the sun,' since the sun is the ultimate source of both light and shade. But for the correctness of the Vedic image, Henry Lord's voice, however faint, is support of a very definite sort: the *hippodendron* is *achāya*.

For the leaflessness of the *arvā*, no parallels have been found. It is suggested, however,[14] that, since leaflessness is the natural complement to, or possibly even the cause of, shadelessness, the use of the adjective *apalāśa* may be due to the composite nature of the poet's image: the arboreality being retained in the mention of the leaf, even though

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[9] *Odyssey* XIV.328. In the time of Homer the worship of the god, who, as Hesiod (Rzach: Fr. 156) has it, dwelt in the trunk of the oak, was already ancient. *Iliad* XVI.235 mentions the archaic customs of the Selloi, the attendant priests, who went with unwashed feet and slept upon the ground (*ἀνιπτόποδες χαμαιεῦναι*).

[10] *Geography*, 16.2.38.

[11] *Ekguden i Dodona: Acta Universitatis Lundensis, Nova Series*, I (1905), pp. 1-62. See especially pp. 47-48. A. B. Cook, *Cl. Rev.* XVII.183 f. (cited by Segerstedt), has shown that, although the evidence is of later date, there actually was a *hestia* at Dodona on which the eternal flame was kept alive. Cf. also Sophocles' Ἀκανθοπλήξ (Dindorf: Fr. 401): *Δωδῶνι ναίων Ζεὺς δμέστιος βροτῶν.*

[12] Henry Lord: *A display of two foraigne sects in the East Indies*, London, 1630, p. 46.

[13] The two names are equated by Darmesteter, *SBE* XXIII.132, note 2. Cf. also Fr. Windischmann, *Zoroastrische Studien*, Berlin, 1863, p. 171-2.

[14] A further conjecture regarding leaflessness may be made: it is possible that the concept of the Axis Mundi as pillar may have been present in the poet's mind. Cf. A. J. Evans, *JHS* XXI (1901), p. 106: 'A special feature of the Mycenaean cult scenes . . . is the constant combination of the sacred tree with pillar or dolmen. The same religious idea—the possession of the material object by the *numen* of the divinity—is common to both.'

For suggestions incorporated in the paragraph to which this note is appended, I am indebted to several members of the Society who offered comments on this study following its oral presentation.

the word mean 'defoliate'; and the equine character being affirmed in the noun *arvā*. Whatever may have been the order of ideas in the poet's mind, however, the image is comprehensible by even the puzzled modern reader if the *arvā* be taken to be Agni, for in that case it would, as the spirit in the tree, *itself* have no foliage, and, as the source of light, itself *cast* no shade. But these are merely speculations concerning a very complex figure; and the use of *apalāśa* to describe either horse or tree remains as yet without analogue.

What, finally, is the *arvā*? Segerstedt has suggested that fire was worshipped in the Dodonian oak; and it is a permissible surmise, then, that it was the one pure spirit of fire whose guidance Odysseus sought, as it was in the tongue of flame in the bush on Mount Sinai that Moses heard the messenger.[15] The parallel leads one to wonder whether it may not be Agni, latent in the wood, who is really the *achāyó apalāśó árvā*. Proof in these matters is always difficult; and properly to read the Vedas the ingredient of faith is necessary. In this instance, however, there is support to be had from the Indian tradition itself. In the first stanza of another Vedic hymn, RV 1.65, the subject treated is the well-known flight of Agni to the waters. Sāyaṇa, commenting on the passage, quotes a different version of the same story; and in this version Agni is said to have become a horse and to have dwelt within a tree. The passage is from the Tāittirīya Brāḥmaṇa (1.1.3.9); the words are these: first the translation: 'Agni concealed himself from the gods; having transformed himself into a horse, he remained in the *aśvattha* tree for a year,' *agnir devebhyo nilāyata / aśvo rūpaṃ kṛtvā so 'śvatthe saṁvatsaram atiṣṭhat*. The horse is a tree and is shadeless because it is Agni.

From the great, shadeless, leafless *arvā* of the Rig-Veda to the Atharva-Veda's[16] image of a great *yakṣa* in the midst of creation in which are set all gods whatever like the branches of a tree around the trunk, is but a change of figure, not of thought; just as Prajāpati of the Rig-Veda, in whose shadow are death and immortality, can hardly be other than the *puruṣa* of the Atharva-Veda,[17] in which are united immortality and death. And is not, in truth, the teacher in the Praśna Upanishad searching for words to utter the same inexpressible idea as that of the shadeless, leafless *arvā* when he says, 'He enters into the highest imperishability who comprehends that shadeless (*achāyam*), incorporeal, bloodless, bright eternity'?[18]

The conclusion, then, may be stated in these terms: That the tree in which the *aśva* dwells is the *aśvattha*, but that in the bold image of RV 10.27.14, the horse and the tree are one, as are the spirit and the body; and that the *aśva* or *arvā* is Agni; and that this fiery spirit, latent in the wood, is that which sanctifies the tree, wherefore it becomes sacred and an object of worship, a symbol holy to the Norseman as Yggdrasill, as the tree in the *castus nemus*, to Odysseus as the oak at Dodona which should reveal to him the will of the Lord; and to the Vedic seer not even as a tree at all, but as the *achāyó apalāśó árvā*, the spirit that quickens, der Geist der sich den Körper baut, the protean, the transient, which, in those greatest words of Śaṅkara, *neśvarād anyaḥ*, is no other than the Īśvara.

[15] *Acts*, 7.30: . . . ἄγγελος ἐν φλογὶ πυρὸς βάτου.

[16] AV 10.7.38: *mahád yakṣáṃ bhúvanasya mádhye tápasi krāntáṃ salilásya pṛṣṭhé / tásmiṃ chrayante yá u ké ca devá vṛkṣásya skándhaḥ paríta iva śákhāḥ.*

[17] AV 10.7.15: *yátrāmṛ́taṃ ca mṛtyúś ca púruṣe 'dhi samáhite.*

[18] Praśna Upanishad 4.10: *param evā 'kṣaram pratipadyate sa yo ha vai tad acchāyam aśarīram alohitaṃ śubhram akṣaram vedayate yas tu somya / sa sarvajñaḥ sarvo bhavati.*

PUṢAN IN THE SĀMA, YAJUR, AND ATHARVA VEDAS

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[This article continues and supplements the investigation of the Vedic nature and rôles of the god Pūṣan begun by the author in his *Pūṣan in the Rig-Veda* (Princeton, 1941). Two sections are devoted to the examination of each Veda. The second section in each case contains the text, translation, and exegesis of the passages (exclusive of the Brāhmaṇa portions of the Black Yajur Veda and possibly some few Mantras of the Māitrāyaṇī recension that have been impossible to control) in which the god is mentioned. Each first section is a synthesis and interpretation of this material.]

I. SĀMA VEDA

1. IN THE SV the god Pūṣan is referred to in eleven passages.[1] Six of the passages belong to the *pūrvārcika* and five to the *uttarārcika*. Two of the stanzas in the *uttarārcika* are identical with stanzas in the *pūrvārcika*, so that, in reality, significant references to the god amount only to nine. Eight of the nine passages are taken from the RV, one from the first book, four from the sixth, and three from the ninth; the remaining passage must be considered original to the SV, for it appears nowhere else in Vedic literature.

It is obvious that the SV is relatively unimportant in our study of the god's Vedic nature, having very little, if anything, to contribute. He is associated with Agni once, with Indra three times, and with Soma four times.

His name appears in 1.75 (= RV 6.58.1) which is a stanza of a decade addressed to Agni, describing his powers and singing his praises. Pūṣan here seems to be taken by the assembler of the decade as an epithet of Agni or a name for one of his aspects (cf. RV 2.1.6).

1.148 and 1.202 are stanzas in decades that are addressed to Indra, and correspond respectively to the fourth and first stanzas of RV 6.57, a hymn invoking the duality Indra-Pūṣan. 2.1225 (= RV 1.89.6), which contains the names Indra, Pūṣan, Tārkṣya, and Bṛhaspati, is the third in a group of three stanzas, the first of which is addressed to Indra and the second to the All-gods. In these cases, then, Pūṣan's presence in the SV would seem to be dependent upon his Rig-Vedic relationship with Indra.

In like manner, Pūṣan's presence in other SV passages may be accounted for by reason of his Rig-Vedic relations with Soma. His name appears, usually along with that of Soma, in stanzas which belong to groups of stanzas that are addressed to Soma. All but one are taken from the ninth book of the RV, the so-called Soma-book. That one stanza (1.154), addressed to the duality Soma-Pūṣan (cf. RV 2.40), is original to the SV but throws no light upon the god's character. The others are 1.427 (= 2.717 = RV 9.109.1), 1.546 (= 2.168 = RV 9.101.7), and 2.433 (= RV 9.61.9).

In one stanza (2.943) Pūṣan is not named, but, since it is equivalent to RV 6.53.10, the reference clearly is to him. This stanza is a unit by itself in the *uttarārcika*. It is preceded by a group of three (the usual unit in this part of the SV) addressed to Soma and corresponding to RV 9.111. 1,3,2, and is followed by two stanzas which, like it, are units by themselves. These latter are equivalent to RV 1.86.8 and 6.52.9 and are addressed to the Maruts and All-gods respectively.

2. Here follows the one stanza that contains the name Pūṣan and is original to the SV.

1.2.2.1.10 (1.154)

sómaḥ pūṣā́ ca cetatuḥ / víśvāsāṃ sukṣitīnā́m / devatrā́ rathyòr hitā́

Soma and Pūṣan, honored charioteers among the gods, know all fair abodes.

[1] In addition, his name occurs in the first group of *purīṣapadāni* of the *mahānāmnyas* which is a collection of verses that has been assigned traditionally to the SV (see, however, I. Scheftelowitz, Die Mahānāmnyas, eine dem Ṛgveda-Zeitalter zugehörige Hymne, *ZII* 1.58-68 (1922)). The SV recension reads: *evā́ hy èvā́ evā́ hy àgne evā́ hìndra evā́ hí pūṣan evā́ hí devāḥ* (see S. Goldschmidt, Der VIIte prapāṭhaka des Sāmaveda-Arcika in der Naigeyaçākhā, *Monatsb. d. Kön. Ak. z. Ber.* 244 ff. (1868); also S. Sámaśramí's *Sáma Veda Saṅhitá*, in *Bibl. Ind.* 2.384 (Calcutta, 1876); and also W. Caland's *Die Jaiminīya-Saṃhitā*, in *Indische Forschungen* 2.60 (Breslau, 1907)). For other readings and other mentions see Scheftelowitz, loc. cit.

c. The resolution and interpretation of this line is difficult. Sāyaṇa reads it as *devatrā rathyas arhitā*. Vivaraṇam (a commentary on the SV) interprets it as *devatrā rathyor hitā*' and understands the dual *hitā*' to refer to Soma and Pūṣan and the dual *rathyor* to refer to the sacrificer and his wife.[2] The meaning of the last two words, accordingly, would be 'Kindly disposed toward the sacrificer and his wife.' J. Stevenson[3] translates the stanza: 'Soma and Pūṣan both know all the blissful abodes and they are appointed to convey to the gods the offering of the sacrificer and his wife.' T. Benfey[4] renders: 'Soma, Puschan sind wohlbekannt mit aller braven Wohnungen, gottwärts leiten die Wagen sie.' R. Griffith[5] translates: 'Soma and Pūṣan, kind to him who travels to the gods, provide dwellings all happy and secure.' B. B. Vidyabhushan[6] interprets thus: 'Soma and Pūṣan, both worthy of being borne in a chariot among the gods, know of all the good men.' The stanza is out of context and, unfortunately, occurs nowhere else in Vedic literature. *Rathyohitā* (from *rathyas* + *hitā*) or *rathyāhitā*, both meaning 'appointed as charioteers,' are possible emendations. For the conception of Soma and Pūṣan as charioteers one should compare, perhaps, RV 2.40.3 wherein the two gods are invoked to urge on the seven-wheeled, five-reined chariot that is yoked by prayer, that measures the atmosphere and travels on every side. To be compared also, possibly, are RV 6.55.2 and 6.56.2,3 where Pūṣan receives the epithet *rathītamaḥ* 'most excellent charioteer,' and 9.66.26 where Soma receives the same epithet.—For *-hitā* the Jāiminīya Saṃhitā[7] has *-hitaḥ*.

[2] See Sámaśramí, op. cit. 1.354 note 2.

[3] *Translation of the Sanhitá of The Sáma Veda* 29 (London, 1842).

[4] *Die Hymnen des Sâma-veda*, hrsg., übers. und mit Glossar versehen von Theodor Benfey (Leipzig, 1848).—Microcopy, negative. Reproduced 1940 at Princeton University Library from a copy in the Library of Congress. Listed as Film 2339.1848.11.

[5] *The Hymns of the Samaveda* (Benares, 1916).

[6] *Sāmavedasaṃhitā* (*The Calcutta Sanskrit Series*, 16), 1.208 (Calcutta, 1936).

[7] See Caland's *Die Jaiminīya-Saṃhitā* 42.

II. YAJUR VEDA[8]

1. On the basis of an examination of TS, KS, KSA, Kap.S, MS, VS, and VSK it has been found that Pūṣan is mentioned in some fifty-nine Mantras of the YV which occur in neither the RV nor the SV. Only three of these are to be found in the AV.

If we were wholly dependent upon the YV for information about Pūṣan a satisfactory reconstruction of the god would be practically impossible. Nowhere in this Veda does he emerge as a distinct personality. None of the Mantras can be said to describe or glorify him. By and large the composers of these formulae evince the same lack of interest in the other deities, a lack that is in inverse proportion to their increasing interest in the sacrifice itself. In their eyes the mechanics of the sacrifice have become all important, while the gods have become incidental to the rites and an understanding of their natures unnecessary. This is not to say that the gods are mere figureheads, altogether characterless (although that is the case in many passages), and that their natures are unknown to the writers of the Mantras. Rather it is that they accept the results of the Rig-Vedic bards' inquiries into and meditations upon the powers and rôles of the various divinities and show no inclination to pursue this line of religious thought. Consequently the gods exhibit little development in the YV except that they are often arbitrarily associated with the multifarious minutiae of the sacrifice in order to dignify and enhance those minutiae and hence are artificially and arbitrarily endowed with a number of ritualistic functions. Partly too a god is connected with some particular feature of a rite because probably it is believed that he contributes to the efficacy of the rite, but generally he is not considered the *sine qua non*. It is true that sometimes a god is chosen for a sacrificial activity or assigned a sacrificial position because it is appropriate to one of his recognized functions, but often there is no attempt to suit the activity or position to the god's nature.

In the light of these observations, then, we are not surprised that only a fraction of the new

[8] For a description of the manner in which the various recensions have been controlled see notes to the indices at the end of this article.

material of the YV is at all significant for our study of Pūṣan's indivduality. If any of his activities can be said to receive emphasis it is his supervision of and concern with cattle. Thus the sacrificer prays that he may become rich in cattle by means of a worship of Pūṣan (KS 5.1). In KS 7.2 he receives the epithet *paśupāḥ* (this is also Rig-Vedic) 'guardian of cattle,' and in MS 4.1.1 is called a protector (*paraspā́*) of cattle. In VS 10.30 he is characterized by the appositional form *paśúbhir* 'cattle' which is in a vein similar to the statement 'Pūṣan is cattle,' found in several places in the Brāhmaṇas of the Black YV and in other Brāhmaṇas. Similarly the cow used in a certain rite is said to be Pūṣan (VS 38.3). According to Āp.Ś, in a certain ceremony where the calf is brought to the cow in order to start the flow of her milk, the formula 'Let Pūṣan set thee near by' is employed, and it may be that his connection with cattle has something to do with his presence here.

Pūṣan as god of paths and guide is accorded attention in several passages. He is asked to guard the paths (TS 1.2.4.2[i]);[9] he is addressed as *prapathyà* 'he of the forward [-leading] path' (TS 7.3.15.1) and is requested to protect the suppliant *prapathe*[10] 'on the path that [leads] forward' (KS 7.2—cf. RV 10.17.4); the Path is Pūṣan's wife (KS 9.10). TS 4.1.2.2[f] probably is evidence for the conception of him as guide or as pathfinder, for it is uttered as they go to the place where the clay is to be dug (in the ceremony of the fire ritual), and the Brāhmaṇa (TS 5.1.2.4) to the passage explains him as *ádhvanaṃ saṃnetā́* 'leader together of roads.'

There are a number of allusions to Pūṣan's rôle as god of riches and dispenser of gifts. In TS 1.2.3.2[e] he is thought of as approaching the sacrificer with gifts; together with other deities he is invoked to give (KS 14.2) and to unite the suppliant with offspring and wealth (KS 35.3). The devout man begs him to guard his wealth (MS 4.12.6), and the householder, to secure his property while on a journey, requests that he protect his home (KS 7.3). He is described as *viśvávedā* 'all-possessing' (TS 1.8.12.2[g]—cf. RV 1.89.6).

Of Mantras that are at all pertinent to our study there remain some few miscellaneous ones which, like those cited above, attest or suggest functions or characteristics or relationships of Pūṣan already existing and more fully evidenced in the Rig Veda. The duality Indra-Pūṣan is mentioned in TS 5.6.14.1 and twice Indra is termed *pūṣaṇvān* (VS 28.27 and KS 29.1 where Indra is asked to eat *karambhá* for which cf. RV 3.52.7, 6.57.2, 6.56.1). Agni is also called *pūṣaṇvān* (KS 38.10). The duality Soma-Pūṣan is mentioned in VS 24.1 and KS 11.12. MS 1.1.12 which invokes the god to untie the knot that binds the bunch of *barhis* may show an extension of Pūṣan's rôle as 'Releaser' (cf. RV 1.42.1, 6.55.1, 8.4.15, 16; AVŚ 6.112.3, 6.113.2; AVP 1.70.4, 2.61.5, and see *Pūṣan in the Rig-Veda,* 33). TS 4.2.8.1[a] says: '. . . Pūṣan has placed me in the world of pious deed (i.e. heaven).' This certainly suggests a Pūṣan *psychopompos* (cf. AVŚ 16.9.2). In MS 4.12.6 he receives the same epithet *áprayuchan* 'alert' as in RV 10.17.5. The two very late formulae in VSK (40.15, 16) certainly suit the god's Rig-Vedic solar character, while 40.15 may also possibly refer to his ability to find and reveal that which is hidden.

It is apparent, then, that the evidence of the YV, although it adds nothing new, reinforces in some particulars the Rig-Vedic picture of Pūṣan.

2a. Here follow the Mantras, verse and prose, of the Tāittirīya Saṃhitā, not occurring in the RV or SV, which contain a mention of or reference to Pūṣan.

1.1.2[11]

2[n]. pūṣā́ te granthíṃ grathnātu / sá te mā́ sthāt

Let Pūṣan tie thy knot. For thee it (i.e. the knot) shall stand on me.

a. Te (also in *b*) = the bundle of sacrificial grass (*barhis*). Cf. MS 1.1.12:7.9 where Pūṣan is asked to untie the knot.—*b.* MS, KS, Āp.Ś, and MŚ have *mā́ sthāt.* A. Weber[12] and Sastri-Srini-

[9] This *pāda* suggests that his solar affiliations were recognized, since it is recited as the sacrificer looks at the sun.

[10] The variant of MS 1.5.4,11, *pathipā́ḥ* 'lord of the way,' is equally significant.

[11] In 1.1.1-13 are cited the Mantras for the Adhvaryu at the new and full moon sacrifice. The Mantras in this *anuvāka* accompany the gathering of *barhis* and the tying of it with a cord.

[12] *Die Tāittirīya Saṃhitā,* in *Indische Studien* 11-12.2 (Leipzig, 1871).

vasacharya[13] have *mā́ "sthāt.* M. Bloomfield[14] has *sa te māsthāt.* A. B. Keith[15] translates thus: 'that knot shall mount me.' Caland[16] renders thus: 'Nicht treffe dieser dich.' I suggest the resolution *mā á sthāt.* According to Āp.Ś 1.4.14-5 the collector of the *barhis,* having made his bundle and tied it, conceals the knot (presumably under the bundle) saying *sá te mā́ sthāt,* then lifts it and puts it on his head and carries it to the place of sacrifice saying *índrasya tvā bāhúbhyām úd yache / bṛ́haspáter mūrdhnā́ harāmi* (TS 1.1.2.2°): 'With the arms of Indra I hold thee up, I carry thee with the head of Bṛhaspati.' The sentence *sá te mā́ sthāt,* therefore, may mean that the knot (which is on the lower side of the bundle) shall rest on the head of the collector.

1.1.4

2m.[17] devásya tvā savitúḥ prasavè 'śvínor bāhúbhyāṃ pūṣṇó hástābhyām agnáye júṣṭaṃ nír vapāmi agnī́ṣómābhyām

At the impulse of God Savitar, with the arms of the Aśvins, with the hands of Pūṣan, I offer thee (i. e. the offering) welcome to Agni, to Agni and Soma.

1.1.7

2k.[18] yā́ni gharmé kapā́lāni / upacinvánti vedhásaḥ / pūṣṇás tā́ny ápi vratá / indravāyū ví muñcatām

The shards[19] which the priests [in charge of the sacrifice][20] gather together for the cauldron (i. e. to form a cauldron), these are in the dominion of Pūṣan. Let Indra and Vāyu release them.

1.2.2.[21]

1a. ā́kūtyāi prayúje 'gnáye svā́hā / medhā́yāi mánase 'gnáye svā́hā / dīkṣā́yāi tápase 'gnáye svā́hā / sárasvatyāi pūṣṇè 'gnáye svā́hā

Hail to the intention, to the impulse, to Agni! Hail to the wisdom, to the intelligence, to Agni! Hail to the consecration, to the penance, to Agni! Hail to Sarasvatī, to Pūṣan, to Agni!

d. The Brāhmaṇa (TS 6.1.2.2) says that Sarasvatī is speech and Pūṣan is the earth.

1.2.3

2e.[22] víśve devā́ abhí mā́m ā́ 'vavṛtran / pūṣā́ sanyā́ / sómo rā́dhasā / devā́ḥ savitā́ vásor vasudā́vā

All the gods have drawn near me; Pūṣan with gain [has drawn near me], Soma with a gift, [and] God Savitar, the bestower of wealth.

1.2.4

2i.[23] pūṣā́ 'dhvanaḥ pātu

Let Pūṣan guard the ways.

a. The Brāhmaṇa (TS 6.1.7.6) says that Pūṣan is the earth.

1.3.10

1-2h.[24] vā́tasya tvā dhrā́jyāi pūṣṇó rā́ṅhyā apā́m óṣadhīnāṃ róhiṣyāi

[I take] thee[25] for the whirling movement of the wind, for the speed of Pūṣan, for the increase of the waters, for the growth of the plants.

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[13] *The Tāittirīya Brāhmaṇa* 63 (Mysore, 1911).

[14] *A Vedic Concordance* 958 (*HOS* 10, Cambridge, Mass., 1906).

[15] *The Veda of the Black Yajus School* 2 (*HOS* 18, Cambridge, Mass., 1914).

[16] *Das Śrautasūtra des Āpastamba* 15 (Göttingen, 1921).

[17] This passage, as far as *hástābhyām,* occurs so frequently in Vedic literature that it may be considered a commonplace liturgical formula. See Bloomfield, *A Vedic Concordance* 492-4. Cf. AVŚ 19.51.2; AVP 5.40.1; 16.70.1.

[18] This Mantra is recited as the eight shards used in this rite are closely fitted together to form a cauldron.

[19] For this meaning of *kapāla* see J. Eggeling, *SBE* 26. xxvii-xxix.

[20] For *vedhásaḥ* see note below to AVŚ 1.11.1*b*.

[21] The Mantras of this *anuvāka* concern the sacrificer's preparation for the Soma sacrifice. Our Mantra here accompanies four oblations.

[22] This Mantra is connected with the bestowing of gifts in the Soma sacrifice. MS 1.2.3: 12.9 and KS 2.4: 10.9; 23.6: 81.18-19 have *sanīṅdm* and *rā́dhasām.* As Bloomfield-Edgerton-Emeneau suggest (*VV* 3 § 588), in MS and KS quite probably a noun 'giver' is to be supplied: 'Pūṣan [is the giver] of gifts' etc.

[23] In the ritual this *pāda* is recited as the sacrificer looks at the sun.

[24] This Mantra, along with *e-g,* accompanies the pouring off of the fat from the sacrificial victim and the mixing it with butter, etc.

[25] I. e. *vásā,* the melted fat mixed with water in which the portions have been cooked.

1.7.11

1.[26] pūṣā́ páñcā 'kṣareṇa pañktím úd ajayat

Pūṣan won the Pañkti with five syllables.

a. Cf. MS 1.11.10, KS 14.4, and VS 9.32.

1.8.12 [27]

2[g]. ávinno agnír gṛhápatiḥ / ávinna índro vṛddháśravā / ávinnaḥ pūṣā́ viśvávedā / etc.

Present [28] is Agni, the lord of the house; present is Indra, he of great renown; present is Pūṣan, all-possessing; etc.

abc. MS, KS, VS, and ŚB have *ávitta.* See Bloomfield-Edgerton, *Vedic Variants,* 2, § 871.

1.8.13

3[h]. agnáye svā́hā / sómāya svā́hā / savitré svā́hā / sárasvatyāi svā́hā / pūṣṇé svā́hā / etc.

Hail to Agni! Hail to Soma! Hail to Savitar! Hail to Sarasvatī! Hail to Pūṣan! etc.

2.4.5 [29]

1[b]. savitā́ yáḥ sahasríyaḥ / sá no gṛhéṣu rāraṇat / ā́ pūṣā́ etv ā́ vásu

May Savitar the thousandfold gladden us in our homes; let Pūṣan come, let wealth come [to us].

b. AVP 1.39.2 has *raṇyatu.*

3.3.9 [30]

1-2[c].[31] devā́nām eṣá upanāhá āsīt / apā́m gárbha óṣadhīṣu nyàktaḥ / sómasya drapsám avṛṇīta pūṣā́ / bṛhánn ádrir abhavat tád eṣām

This was the bundle of the gods, the embryo of the waters concealed in the plants. Pūṣan chose [for himself] a drop of *soma.* A large stone it became for them.

abcd. MS 2.5.10 has *apā́m pátir vṛṣabhá óṣadhīnām* in *b*; KS 13.9 omits *vṛṣabhá.* In *d* both MS and KS have *yát tád āsīt* for *tád eṣām.* AVŚ 9.4.5 reads: *devā́nāṃ bhāgá upanāhá eṣaḥ / apā́m rása óṣadhīnāṃ ghṛtásya / sómasya bhakṣám avṛṇīta śakráḥ / bṛhánn ádrir abhavad yác chárīram*: 'The share of the gods [was] this load, the sap of waters, of plants, of ghee. The mighty one (i. e. Indra) chose a draught of *soma*; a great stone became what [was his] body.' AVP 16.24.4 has *drapsam* in *c*, but otherwise is the same as AVŚ.

4.1.2 [32]

2[f]. pūṣṇā́ sayújā sahá / pṛthivyā́ḥ sadhásthād agníṃ purīṣyàm aṅgirasvád áchehi

With Pūṣan as comrade from earth's region go thou forward like Aṅgiras to the earthly [33] Agni.

a. In endeavoring to account for Pūṣan here the Brāhmaṇa (TS 5.1.2.4) explains that he is *ádhvanāṃ saṃnetā́* 'leader together of roads.'

4.2.5 [34]

6[t]. kā́mam kāmadughe dhukṣva / mitrā́ya váruṇāya ca / índrāyāgnáye pūṣṇé / óṣadhībhyaḥ prajā́bhyaḥ

O milker of desires, milk desires to Mitra and Varuṇa, to Indra, to Agni, to Pūṣan, to plants, to creatures.

4.2.8

1[a].[35] abhy àsthād víśvāḥ pṛtanā árātīḥ / tád agnír āha tád u sóma āha / bṛhaspátiḥ savitā́ tán ma āha / pūṣā́ mā 'dhāt sukṛtásya loké

'He has overcome all armies, all foes,' thus spake Agni and thus spake Soma, thus spake

[26] This Mantra, along with others in this *anuvāka,* is pronounced by the sacrificer (during the Vājapeya ritual) at the command of the Adhvaryu. The sacrificer thus wins the same success as the gods whose victories are proclaimed.

[27] This section deals with the preparation of the water of consecration to be used in the Rājasūya rites. With *g* the sacrificer announces himself.

[28] *ávinnaḥ* (*ávitta*) 'present, obtained' here may have the meaning 'informed, notified.' See Eggeling, *SBE* 41.89, note 2.

[29] In this *anuvāka* are the Mantras for the Upahomas before the offering to Agni Sviṣṭakṛt.

[30] The ritual is the offering of an aged bull when he has been supplanted as leader by a new bull.

[31] This stanza accompanies the offering of the omentum.

[32] The Mantras in this section accompany the approach to the clay in the ceremony of the fire ritual. With *d-f* they go to where they intend to dig the clay.

[33] I. e. as opposed to the Agni who dwells in the waters. Keith, *HOS* 19.291 translates: 'Agni of the dust.'

[34] Here are given the Mantras for the ploughing of the ground for the sake of the piling of the Āhavanīya. It is recited as the furrows are ploughed three by three.

[35] Keith, *HOS* 19.320 says with reference to this stanza: 'With *a* [*i. e.* the complete stanza] the horse is made to advance to the Darbha bunch with its right foot. . . .' This whole section deals with the movements of the horse in the preparation of the ground for the fire.

Bṛhaspati and Savitar of me. Pūṣan has placed me in the world of pious deed (i. e. heaven).

a. MS 1.5.3 has *àsthāṃ*. AVŚ 10.5.36; 16.9.1 have *àṣṭhāṃ*. This *pāda* is apparently a direct quotation. See Bloomfield-Edgerton, *Vedic Variants,* 1, § 320.—*b.* This *pāda* together with *d* forms AVŚ 16.9.2 and AVP 18.29.2.—*d.* MS 1.5.3. reads *nā ádhāt*. AVŚ 16.9.2 reads *mā dhāt*. AVP 18.29.2 has *loko* for *pūṣā́*.

4.3.9 [36]

1[e]. ádityāi bhāgò 'si / pūṣṇá ádhipatyam / ójа spṛtám / triṇavá stomáḥ

Thou art Aditi's share, Pūṣan's overlordship, vigor saved, the twenty-sevenfold Stoma.

4.3.10 [37]

2. tráyoviṅśatyā 'stuvata / kṣudráḥ paśávo 'sṛjyanta / pūṣā́ 'dhipatir āsīt

They praised with twenty-three; small cattle (or 'beasts') were created; Pūṣan was [their] overlord.

4.4.9 [38]

1. pūṣā́ somakráyaṇyāṃ

[Thou art] Pūṣan in the cow which serves as purchase-price for Soma.

4.4.10 [39]

3[b]. revátī nákṣatram / pūṣā́ devátā

[Thou art] Revatī the Nakṣatra, Pūṣan the divinity.

4.7.6 [40]

1. . . . pūṣā́ ca ma índraś ca me . . .

May Pūṣan and Indra for me [be auspicious through the sacrifice].

4.7.7 [41]

2. . . . sārasvatáś ca me pāuṣṇáś ca me . . .

[May the cup] for Sarasvatī and [the cup] for Pūṣan [prosper] for me [through the sacrifice].

5.5.12 [42]

1. āraṇyò 'jó nakuláḥ śákā té pāuṣṇáḥ

The wild goat, the ichneumon, the Śakā,[43] these are for Pūṣan.

5.5.22 [44]

1. pāuṣṇáḥ śyāmáḥ

The dark one for Pūṣan.

5.5.24 [45]

1. pāuṣṇáu rajatánābhī

The two with white navels for Pūṣan.

5.6.12 [46]

1. tisráḥ śyāmā́ vaśā́ḥ pāuṣṇíyaḥ

Three dark barren cows are for Pūṣan.

5.6.13 [47]

1. somāpāuṣṇáḥ śyāmálalāmās tūparā́ḥ

The dark-spotted hornless ones are for Soma and Pūṣan.

5.6.14 [48]

1. tisró dhātré pṛṣodarā́ āindrāpāuṣṇáḥ śyétalāmās tūparā́ḥ

Three with speckled bellies are for Dhātar; the white-spotted hornless ones are for Indra and Pūṣan.

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[36] This section contains Mantras for the fourth layer of bricks used in the construction of the fire altar.

[37] This section contains the Mantras for the seventeen bricks called Sṛṣṭi used in the construction of the fire altar.

[38] This section has thirty-three formulae to accompany the bricks called Yajñatanū used in the construction of the fire altar. As a rule, each Mantra is addressed to a brick.

[39] This section contains the Mantras for the Nakṣatra bricks.

[40] This section and the following contain the Mantras of the Adhvaryu of the Vasor Dhārā, the oblation made after the completion of the setting up of the fire.

[41] See preceding note.

[42] This section is one of eleven which contain a list of the wild animals sacrificed in the Aśvamedha.

[43] This word may designate a kind of bird or fly or long-eared beast. See Macdonell-Keith, *Vedic Index* 2. 346-7 (London, 1912).

[44] This section is one of three sections which contain a list of the domesticated animals sacrificed in the Aśvamedha.

[45] See preceding note.

[46] This section continues the assignment of animals in the Aśvamedha.

[47] See preceding note.

[48] See preceding note.

5.7.17 [49]

1. pūṣṇó vaniṣṭhúḥ

The rectum [50] is for Pūṣan.

7.3.15 [51]

1. pūṣṇé svâhā / pūṣṇé prapathyâya svâhā / pūṣṇé naráṃdhiṣāya svâhā

Hail to Pūṣan! Hail to Pūṣan, to him of the forward [-leading] path! Hail to Pūṣan, watcher of men!

b. prapathyà is translated 'guardian of travelers' by Keith,[52] and 'protector of travelers' by Eggeling.[53] PW [54] renders it 'der Geleitsmann auf Wegen.' Whitney [55] translates it 'guiding.' Undoubtedly the epithet designates the Pūṣan whose role is pathfinder. For the rendering above cf. RV 10.17.6 where it is said: *prápathe pathắm ajaniṣṭa pūṣắ / prápathe diváḥ prápathe pṛthivyắḥ* 'On the forward [-leading] path of paths was Pūṣan born, on the forward [-leading] path of Heaven, on the forward [-leading] path of Earth.' Also see comment to RV 10.17.6 in my *Pūṣan in the Rig-Veda* 87.

7.5.21

1. pāuṣṇáś carúḥ

An oblation to Pūṣan.

2b. Following are the Mantras or parts of Mantras of the Kāṭhaka Saṃhitā, not occurring in RV, SV, or TS, which mention or refer to Pūṣan.

5.1: 44.12-13

pūṣṇo 'haṃ devayajyayā puṣṭimān paśumān bhūyāsam

By means of a worship of Pūṣan may I become prosperous and rich in cattle.

6.8: 58.1-2

sajūḥ pūṣṇāntarikṣeṇa

Along with Pūṣan, with the atmosphere.[56]

7.2: 64.10-11

pūṣā mā prapathe pātu / pūṣā mā paśupāḥ pātu / pūṣā mā 'dhipatiḥ pātu

Let Pūṣan protect me on the path [that leads] forward; let Pūṣan, the guardian of cattle, protect me; let Pūṣan, the sovereign, protect me.

a. Cf. RV 10.17.4*b*: *pūṣắ tvā pātu prápathe purástāt.* MS 1.5.4: 71.8; 1.5.11: 80.4 have *pathipāḥ* 'lord of the way' for *prapathe.*—*b.* For *paśupāḥ* cf. RV 6.58.2.

7.3: 65.1-2 [57]

imān me mitrāvaruṇāu / gṛhān gopāyataṃ yuvam / avinaṣṭān avihrutān / pūṣāinān abhi rakṣatu / āsmākaṃ punar āgamāt

For me, O Mitra and Varuṇa, guard this dwelling. Let Pūṣan protect it [so that it remains] intact and undamaged until our return.

9.10: 112.7

pūṣā svagākārāiḥ

Pūṣan with Svagā-exclamations.

9.10: 112.8

pathyā pūṣṇaḥ [58]

The Way is Pūṣan's [wife].

11.12: 159.15-16

somāpūṣaṇemāu devāu / mahi vo mahatām avaḥ / varuṇa mitrāryaman / avāṅsy ā vṛṇīmahe

Soma and Pūṣan [are] the two deities here; great is the favor of you mighty ones. O Varuṇa, O Mitra, O Aryaman, we desire your favors.

bcd. These lines are the same as RV 8.67.4.

14.2: 202.1-2

pra no yachatv aryamā / pra pūṣā pra bṛhaspatiḥ / pra vāg devī dadātu naḥ

Let Aryaman give to us, let Pūṣan, let Bṛhaspati

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[49] This section is one of fourteen which deal with the ceremony of offering the different members of the horse to various deities in the Aśvamedha.

[50] Or perhaps a particular portion of the entrails near the omentum.

[51] The Mantras of this section accompany an oblation to the All-gods in the Aśvamedha.

[52] *HOS* 19.595.

[53] *SBE* 44.293.

[54] S. v.

[55] *A Sanskrit Grammar*, § 1212k.

[56] With this phrase the sacrificer makes an offering at the Agnihotra.

[57] Verses spoken to secure the property of a man who wishes to leave home on a journey.

[58] GB. 2.2.9; Vāit. 15.3; MŚ 2.2.1.41 have *pathyā pūṣṇaḥ patnī.*

give to us, let the goddess Speech bestow [gifts] upon us.

b. RV 10.141.2*b* has *bhágaḥ* for *pūṣā*.

29.1: 168.6-11

harivāṅ indro dhānā attu / pūṣaṇvān karambham / sarasvatīvān bhāratīvān parivāpaḥ / indrasyāpūpaḥ / [59] mitrāvaruṇayoḥ payasyā

Accompanied by his bay steeds let Indra eat fried grain; accompanied by Pūṣan [let Indra eat] gruel; accompanied by Sarasvatī and Bhāratī [let Indra eat] the rice grains; the flour cake [is] Indra's; the curds are for Mitra and Varuṇa.

35.2: 51.14-15

agnir yajurbhiḥ pūṣā svagākārāis ta imaṃ yajñam avantu te mām avantu anu va ārabhe 'nu mārabhadhvaṃ svāhā

Let Agni with Yajus-formulae, let Pūṣan with Svagā-exclamations further this sacrifice; let them further me; I place myself at your side; place yourselves at mine. Hail!

35.3: 52.1-3

saṃ vaḥ siñcantu marutaḥ / saṃ pūṣā saṃ dhātā / saṃ indraḥ saṃ bṛhaspatiḥ / saṃ vo 'yam agniḥ siñcatu / prajayā ca dhanena ca / āyuṣmantam kṛṇota mā [60]

Let the Maruts, Pūṣan, Dhātar, Indra, Bṛhaspati, unite you; let Agni here unite you with offspring and wealth; make me long-lived.

38.10: 111.19-20

subarhir agniḥ pūṣaṇvān / stīrṇabarhir amartyaḥ / bṛhatī chanda indriyam / trivatso gāur vayo dadhuḥ

Agni who possesses goodly sacrificial grass, who is accompanied by Pūṣan, whose sacrificial grass has been strewn, who is immortal, the Bṛhatī meter, and a three-year-old bull bestow power and vigor.

2c. Below are the majority of Mantras of the Māitrāyaṇī Saṃhitā which mention Pūṣan and which do not occur in RV, SV, TS, or KS.

[59] *abcd* occur in AB 2.24 which is a section that deals with the sacrifice of five oblations, and in RV Kh. 5.7.4, *a-c*.

[60] For a group of very similar verses cf. AVŚ 7.33.1.

1.1.12: 7.9

pūṣā́ te granthíṃ víṣyatu

Let Pūṣan untie thy knot.

a. *te* = the bunch of sacrificial grass. According to ApŚ 2.8.3 the officiating priest recites this formula as (among other duties) he unties the knot that binds a bunch of sacrificial grass. Cf. TS 1.1.2.2[n] (= MS 1.1.2: 2.2; 4.1.2: 3.18) where Pūṣan is asked to tie the knot that binds the *barhis*. It may be in his role (artificially extended) of 'Releaser' (cf. his Rig-Vedic epithets *vimuco napāt* and *vimocana* and his position in AVŚ 6.112.3; 113.2 and AVP 1.70.4; 2.61.5) that he is requested to 'untie.' Since he can 'untie' he therefore is naturally conceived as also possessing the ability to 'tie.'

1.2.3: 12.11

vāyúr gopā́ḥ / tváṣṭādhipatiḥ / pūṣā́ pratigrahītā́ [61]

Vāyu [is] protector. Tvaṣṭar [is] overlord. Pūṣan [is] acceptor.

2.7.12: 91.11-12

pūṣā́ yunaktu savitā́ yunaktu / bṛ́haspátir vo yunaktu / agnés téjasā sū́ryasya várcasā [62]

Let Pūṣan yoke, let Savitar yoke, let Bṛhaspati yoke you with the fire of Agni, with the radiance of Sūrya.

ab. Cf. KS 16.12.

3.15.[63] 3: 178.10

pūṣā́ṇaṃ dorbhyā́m

[I gratify] Pūṣan with the lower parts of his [64] two forefeet.

3.15.[65] 4: 179.1

pūṣṇó navamī́

His [66] ninth [rib on the left side] is Pūṣan's.

[66] Referring to the sacrificial steed.

[61] These *pādas* appear to be connected with the bestowing of gifts at the Soma sacrifice.

[62] These *pādas* occur in a section which gives the Mantras for ploughing the ground for the construction of the Āhavanīya.

[63] Employed in the Aśvamedha.

[64] Referring to the sacrificial steed.

[65] Employed in the Aśvamedha.

4.1.1: 2.6

pūṣā́ vaḥ paraspā́ áditiḥ pretvarīyā́ índro vó 'dhyakṣó 'naṣṭāh púnar éta

Pūṣan [is] your protector; Aditi [is] the protectress of those (i. e. the cows) that go forth [to pasture]; Indra [is] your overseer; come back here unharmed.

a. The address is to the cows. *Vaḥ* refers to them. They are the subject of *éta* (*á* + *ita*).— Undoubtedly *prertvarīpā́* is to be read for *pretvarīyā́*.[67]

4.9.7: 127.8

pūṣā́ tvopávasīdatu [68]

Let Pūṣan set thee near by.

a. I have taken *sīdatu* transitively. TĀ 4.8.2; 5.7.2 and ĀpŚ 15.9.6 have *sṛjatu* for *sīdatu*. *Sṛjatu* with *úpa* + *áva* means 'allow to pass to, admit.'

4.12.6: 198.4-5

áśvinā yajñám ágatam / dāśúṣaḥ púrudaṅsasā / pūṣā́ rakṣatu no rayím

O Aśvins, you performers of wonderful deeds, come here to the sacrifice of the devout man. Let Pūṣan guard our wealth for us.

4.12.6: 198.6-7

imáṃ yajñám aśvínā vardháyantā / imā́u vīryàṃ yájamānāya dhattām / imā́u paśū́n rakṣatāṃ viśváto naḥ / pūṣā́ naḥ pātu sádam áprayuchan

Let these Aśvins who increase this sacrifice confer manly strength upon the sacrificer; let these two guard our herds for us everywhere; let Pūṣan, ever alert, protect us.

2d. Here are the Mantras or portions of Mantras of the Vājasaneyi Saṃhitā which mention Pūṣan and which do not occur in RV, SV, TS, KS, or MS.

10.30 [69]

savitrā́ prasavitrā́ sárasvatyā vācā́ tváṣṭrā rūpáiḥ pūṣṇā́ paśúbhir [70] índreṇāsme bṛ́haspátinā bráhmaṇā váruṇenaújasāgnínā téjasā sómena rā́jñā víṣṇunā daśamyā́ devátayā prásūtaḥ prásarpāmi

I creep forward impelled by Savitar, the impeller, by Sarasvatī, speech, by Tvaṣṭar, forms, by Pūṣan, cattle, by Indra for this one, by Bṛhaspati, devotion, by Varuṇa, might, by Agni, fiery splendor, by Soma, king, by Viṣṇu, the tenth deity.

24.1

sā́umāpāuṣṇaḥ śyāmó nā́bhyām [71]

The dark [goat] of Soma and Pūṣan [is to be bound] to his [72] navel.

28.27 [73]

hótā yakṣat subarhíṣam / pūṣaṇvántam ámartyam / sī́dantaṃ barhíṣi priyé / amṛ́téndraṃ vayodhásam / bṛhatī́ṃ chánda indriyám / trivatsā́ṃ gā́ṃ váyo dádhat / vétv ā́jyasya / hótar yája

May the Hotar priest, granting [him] the Bṛhatī meter, power, a three-year-old bull, and vigor, worship Indra who possesses goodly sacrificial grass, who is accompanied by Pūṣan, who is immortal, who sits on his favorite everlasting sacrificial grass, who bestows strength. Let him enjoy melted butter. Hotar priest, worship!

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[67] See Caland, Vedica, *Acta Orientalia* 5.252-3 (1927), 9.77 (1931); Renou, Index Védique, *The Journal of Vedic Studies* 2.109 (1935) s. v. *prertvarīpāḥ*; and *Vārāha Śrāutasūtra* 1.2.1.9.

[68] According to ApŚ 15.9.6 this is part of a formula pronounced by the Adhvaryu during the Pravargya at that point where the calf is admitted to the cow in order to start her milk flowing.

[69] Formulae for the Daśapeya sacrifices in the Rājasūya ceremony. With the recitation of these the priests creep to their respective hearths to perform the Saṃsṛp ('creeping') oblations.

[70] The word or phrase following the name of each deity in this passage (save for *asmé* after *índreṇa*) is in apposition with the god's name and characterizes him, much in the manner of an epithet. The combination *pūṣṇā́ paśúbhir* is reminiscent of the statement 'Pūṣan is cattle,' found in the Brāhmaṇa-portions of the Black Yajur Veda and in the Brāhmaṇas generally. Such an identification results from an extension of one phase of the god's Rig-Vedic pastoral aspect as seen in stanzas like RV 6.54.6,7 and in an epithet like *paśupā́* 'protector of cattle' (RV 6.58.2; KS 7.2: 64.10).

[71] Part of a passage which enumerates the animals that are to be tied to the sacrificial stakes in the performance of the Aśvamedha and gives the names of the deities to which these animals are severally dedicated.

[72] I. e. the sacrificial steed's.

[73] This formula occurs in a section which is supplementary to VS 19-21 which deal with the Sautrāmaṇī ceremony.

38.3 [74]

ádityāi rā́snāsi / indrāṇyā́ uṣṇī́ṣaḥ / pūṣā́si / gharmā́ya dīṣva

Thou art Aditi's girdle, Indrāṇī's head-band. Thou art Pūṣan. Give [thy milk] for the cauldron.

abcd. In ŚB 14.2.1.8-10 it is said (according to Eggeling's interpretation) [75] that the sacrificer, having called the cow, puts a rope around her horns, reciting *a* and *b*, that then he brings the calf to her to suck with *c*, and leads the calf away with *d*. It would seem that the rope is addressed in *ab* (in VS 38.1 the rope is unquestionably 'Aditi's girdle'), and the cow in *cd*. *Dīṣva* is difficult. PW and Monier-Williams regard it as a form of 4. *dā* 'bind, tie' and PW renders it 'lass dich binden.' Eggeling translates *d* thus: 'Afford (milk) for the cauldron.' R. T. H. Griffith [76] renders: 'Spare some [of the milk] for the Gharma.' A. A. Macdonell [77] takes it as the second person sg. middle imperative of the root aorist of 1. *dā* 'give.'

38.15 [78]

svā́hā pūṣṇé śárase / etc.

Hail to Pūṣan, to the cream! [79] etc.

39.5 [80]

. . . pāuṣṇó viṣpandámāne . . .

[The Mahāvīra is] Pūṣan's when it (i. e. the milk) overflows.

VSK 40.15 [81]

hiraṇmáyena pā́treṇa / satyásyā́pihitaṃ múkham / tát tvā́ṃ pūṣann ápā́vṛṇu / satyádharmāya dṛṣṭáye

The face of the Real (i. e. τὸ ὄν?) [in the sun] is covered by a golden disk. Uncover it, O Pūṣan, that we may see the eternal Real.

VSK 40.16

pū́ṣann ekarṣe yama sūrya prājāpatya vyū́ha raśmī́n sámūha téjo yát te rūpáṃ kályāṇatamaṃ tát te paśyāmi / yo 'sā́v asā́u púruṣaḥ so 'hám asmi

O Pūṣan, only Sage, Yama, Sūrya, thou born of Prajāpati, disperse thy rays, gather them together. The radiance which is thy loveliest form, this I behold. What far-off yonder Being [82] is, He I am.

III. ATHARVA VEDA

1. Pūṣan is referred to in thirty-two passages of the AVŚ and forty-eight passages of the AVP.[83] Of these, nineteen AVŚ stanzas have no Rig-Vedic counterparts, while twenty-four AVP stanzas are unique. Only one whole hymn (AVŚ 7.9) is addressed to him and that coincides with RV 10.17.6,5 and 6.54.9,10. Twelve books of the AVŚ and fourteen books of the AVP have mention of him. There seems to be no concentration of material as in the case of the sixth *maṇḍala* of the RV.

One distinctly feels that there is a difference between the Pūṣan of the RV and the god of this Veda, a difference consisting, in the main, of a marked lack of individuality. The Atharvan writers, for the most part, have employed him mechanically and have addressed him usually in conjunction with one or more gods in stanzas which make it apparent that the Rig-Vedic deities have become of almost equal value.[84] He receives no glorification, certainly no heartfelt worship. He is enlisted merely because of his utility along certain lines and is often asked in various charms and incantations to exercise certain of the powers assigned to him in the RV. Now and then these powers receive an extension and sometimes a rein-

[74] A formula used in the Pravargya ceremony.

[75] SBE 44.474-5.

[76] *The Texts of the White Yajur Veda, Translated* (Benares, 1899).

[77] *Vedic Grammar* § 505 (Strassburg, 1910).

[78] A Pravargya-formula.

[79] More exactly the 'film' or 'crust' on the boiled milk.

[80] An expiatory formula used to remedy any flaw in the performance of the Pravargya ceremony.

[81] This and the following passage are, of course, Upanisadic. It is interesting to note that Pūṣan still retains (one might almost say 'recovers') his solar affiliations.

[82] I. e. the *púruṣa* in the sun.

[83] No *index verborum* for the AVP is in print. Though every effort has been exerted to make a careful perusal of the AVP in the transliterated text of L. C. Barret, it is quite possible that a few occurrences of the god's name have been overlooked.

[84] It is true that one finds such a tendency operative also in the RV, but not to the degree that exists here.

terpretation, but there are no considerable additions to the Rig-Vedic picture of the god and few noteworthy elaborations of any of his aspects.

Save for AVŚ 7.9 and one other verse (AVP 9.12.7) where there is reference to the fact that Pūṣan is supported on his rays, immediately followed by a mention of the sun-god Viṣṇu, there are no allusions in the AV to his solar nature which is to be considered primary for the RV. AVŚ 7.9 is used by Kāuś. 52.12-14 in a rite for the recovery of lost property. The hymn, however, consists of stanzas borrowed from the RV (10.17.6, 5; 6.54.9,10*abc*)[85] and cannot be employed as evidence for any positive or vigorous conception of him in the AV as a god with strong solar affinities. That is not to say that the Atharvan composers were not aware in some measure of his solar background, but his nature has become neutral in their writings; he has faded, he is no longer an active *sun*-god.

If any rôle of Pūṣan can be said to receive prominence in the AV it is that of god of the way (see again AVŚ 7.9 cited above). In a charm to create harmony in a tribal community the tribal chieftain requests (AVŚ 6.73.3) him to make the road leading away from the community 'pathless' (i. e. impassable) so that any recalcitrant kinsmen will be forced to remain at home. Closely associated with his lordship of the way is his rôle as retriever. This is alluded to in AVP 20.25.5; 36.9; 43.3. But most of the passages wherein he is introduced as god of paths show him operating with specialized functions (existing in the RV as well as here) which are secondary accretions to one of his primary Rig-Vedic functions, that of pastoral solar pathfinder.

One such specialized sphere of operation is marriage and marital relations. He is summoned (AVŚ 14.1.39) to serve, during the marriage ceremony, as guide to the bride for her triple circuit of Aryaman's fire. In another hymn treating of marriage rites he is asked (AVŚ 14.2.38 = RV 10.85.37) to escort the bride to the bridegroom for the act of copulation and impregnation. In AVP 1.34.3 it is said that Pūṣan, the 'bestower of kinsfolk,' gave the speaker 'this woman as wife.' He is 'bestower of kinsfolk' (*jñātivid*) because he brings the bridegroom not only the bride but also the bride's relatives which now become relatives of the bridegroom. In AVP 2.61.5 Pūṣan seems to be implored to grant a widow a second husband. Also related, perhaps, to the above-mentioned verses is AVŚ 1.11.1 where invocation is made of Pūṣan and Aryaman in a prayer for easy parturition. In such passages, then, there is some slight extension to the Rig-Vedic picture of the deity.

Another specialized phase of the god's activities, derived from his office of god of paths, is his function as *psychopompos*, i. e. conveyor of the souls of the dead. This receives mention in a hymn (AVŚ 18.2) dealing with funeral rites, one third of which consists of RV material. There he is requested to conduct the dead man to heaven (AVŚ 18.2.53), to remove him hence and deliver him to the world of the Fathers (AVŚ 18.2.54 = RV 10.17.3), to lead the way and protect him on the distant path to the next world (AVŚ 18.2.55 = RV 10.17.4). Another probable reference to this phase of Pūṣan occurs in AVŚ 16.9.2b. Here, then, the Rig-Vedic Pūṣan *psychopompos* is recognized and used by the AV hymn-writers but not appreciably developed.

Pūṣan is mentioned in two agricultural hymns. In a hymn (AVŚ 3.17 which contains much material from RV 10.101 and 4.57) asking for success in plowing, Indra is called upon to press down (i. e. perhaps 'cut') the furrow and Pūṣan to protect it (AVŚ 3.17.4[86] = RV 4.57.7). Another hymn (AVP 12.6) which seeks to procure success in agriculture and which bears a close relationship to AVŚ 3.17 says (stanza 6*abc*): 'Dhātar, Pūṣan, and Bṛhaspati have effected *samajīm*[87] of the earth; the gods who are dispensers of light have effected Kṛṣi (i. e. the personification of the cultivation of the soil).' Pūṣan is brought in here quite probably because of his presence in 3.17.4 which, we have noticed, is an adaptation, with only a minor change, of RV 4.57.7. Neither of these passages speaks necessarily for an agricultural deity.[88]

Another secondary Rig-Vedic phase of the god's nature, preserved but not elaborated by the creators of the Atharvan hymns, is his association with

[85] In AVŚ 7.9.4 there is an additional line *d* which is to be translated: 'May we be united with what has been lost.'

[86] AVŚ reads in *b abhi rakṣatu* 'let . . . protect,' while RV reads *anu yachatu* 'let . . . direct.'

[87] See my comment appended to translation of AVP 12.6.6.

[88] See my *Pūṣan in the Rig-Veda* 18, note 64.

Indra. Twice the duality, Indra-and-Pūṣan, is called upon in conjunction with other deities, once (AVŚ 6.3.1) to give protection, and again (AVŚ 19.10.1 = RV 7.35.1) to be of service in the winning of booty. They are also closely linked in AVŚ 3.14.4 (cited above) and AVŚ 6.67.1 where they are said to have made a circuit of roads in all directions so as to prevent access by enemies to the village of their worshippers.

In several passages, however, the AV presents Pūṣan in a new rôle. He is a liberator from sin, a releaser from the bonds of guilt. He is invoked to such performance in a stanza of a charm which is used to expiate the offense of the marriage of a younger brother before an elder one, and which reads (AVŚ 6.112.3) in translation: 'Let these bonds [of sin] with which the unmarried older brother has been shackled, has been bound limb by limb, be loosened; for they are subject to release. O Pūṣan, wipe off the sins upon an abortionist.' It is interesting to note the presence of *vi . . . muñcatām* 'let be released,' and *vimuco* 'subject to release' of *c*. Both, indeed, are reminiscent of Pūṣan's Rig-Vedic epithets *vimuco napāt* 'son of liberation,' and *vimocana* 'liberator.' The same invocation (i. e. *bhrūṇaghní pūṣan duritáni mṛkṣva*) is made in a stanza of a hymn employed to expiate certain unnamed crimes (AVŚ 6.113.2) and in a stanza of another hymn which prays (AVP 1.70.4) for the release of the husband of a remarried widow from the fetters [of sin] which bind him. The phraseology of this whole latter stanza is quite similar to that of AVŚ 6.112.3. The final bit of evidence for this new function of his is the difficult verse AVP 2.61.5 which appears to entreat Pūṣan to give a husband to a widow along with freedom from sin (for both herself and for him).[89] Here, for the first time, there seems to be a real extension of the god's powers.

The AV passages which are left for our consideration are much less significant than any of those previously discussed. The majority of them show a colorless divinity conventionally summoned in company with many other members of the Vedic pantheon to carry out certain general acts of beneficence and to exert certain magical powers requisite to the occasion and expected of any and all gods. He and others are asked to bestow goods (AVŚ 1.9.1), cattle (AVŚ 3.14.2; 20.127.12 where he is described as *sahasradakṣiṇaḥ* 'he who grants a thousand cattle as sacrificial fee'), offspring and wealth (AVŚ 7.33.1), increase (AVP 2.72.2). He is listed among those to 'quicken' cattle for the sacrificer (AVŚ 14.1.33). He is commanded (AVŚ 5.28.3) to anoint with milk and ghee the magic amulet in which abundance of food, man, and cattle abide,[90] and, with Aryaman and Bṛhaspati, to fasten (AVŚ 5.28.12) the amulet on the householder. He and others are requested to afford deliverance from misfortune (AVŚ 11.6.3), to grant protection from death (AVŚ 19.20.1), to restore a man his life's spirit (AVP 2.80.2), to slay the demon of avarice (AVP 5.26.7), to ward off nightmares (AVP 17.26.14). He is one of the many *adhipatayas* of the Waters (AVP 12.7.7). Such passages as these, for the most part, only serve to indicate that Pūṣan is still a member in good standing of the family of Vedic gods.

2. The following section contains the accented text, translation, and commentary thereto of verses and prose stanzas in the Śāunakan recension of the Atharva Veda in which the name of the god Pūṣan occurs. Except for 14.1.15, which is a combination of parts of two different Rig-Vedic stanzas, all excerpts from the Rig Veda have been excluded. There is but one complete hymn (7.9) addressed to the god in this recension and that is a cento of passages from the Rig Veda, and so it does not appear below.

1.9 Prayer for earthly and heavenly success (for the sacrificer).

1. asmín vásu vásavo dhārayantu / índraḥ pūṣā́ váruṇo mitró agníḥ / imám ādityā́ utá víśve ca devā́ḥ / úttarasmiṅ jyótiṣi dhārayantu

Let Vasus, Indra, Pūṣan, Varuṇa, Mitra, Agni, bestow goods upon this one (i. e. the sacrificer). Let the Adityas and all the gods, too, preserve this one in the higher light (i. e. heaven).

b. AVP 1.19.1*b* has *tvaṣṭā* instead of *pūṣā́*.

1.11[91] Prayer for easy parturition.

[89] Can Pūṣan's connection with marriage and its rites be related somehow to the employment of him in the stanzas just cited?

[90] Undoubtedly *poṣās* of line *a* had much to do with the choice of *pūṣā* for line *b*. Word-play is an important factor in this sort of hocus-pocus

[91] The ceremony at the beginning of which this hymn

1. vā́ṣaṭ te pūṣann asmín sū́tāu / aryamā́ hóta kṛṇotu vedhā́ḥ / sísratāṃ nā́ry ṛtáprajātā / ví párvāṇi jihatāṃ sū́tavā́ u

At this birth, O Pūṣan, let Aryaman as master (or 'expert') *hotar*-priest utter [the exclamation] *vaṣaṭ* for thee. Let the woman, duly engendered, relax; let her legs spread apart [for her] to give birth.

a. *Vā́ṣaṭ* is an exclamation uttered by the *hotar*-priest at the end of the *yājyā* 'offering-verse,' upon hearing which the Adhvaryu casts the oblation into the fire. In this stanza Aryaman functions as the former and Pūṣan as the latter.—*b.* *Vedhás* many times in the Vedas has the meanings 'prominent, chief, leader in charge, overseer.' It is an apt epithet of the *hotar*-priest as one of the important officiators at the sacrifice.—*c.* *Sísratāṃ* appears to be the 3d pl. of the present middle imperative of *sṛ*. *Vi* of line *d* is to be taken with it as well as with *jihatāṃ*. *Nā́ri* seems to be the subject. The whole stanza is metrically irregular. Unless we can suppose that *nā́ri* carries a plural significance in that it is the woman's *limbs* (see *ví párvāṇi jihatāṃ* of *d*) that it is prayed will relax, we must make some sort of emendation, possibly *sisṛtāṃ*, 3d sg. mid. The general sense, however, is clear enough. For a full discussion of the stanza's problems see W. D. Whitney [92] and M. Bloomfield.[93]

3.14 [94] Charm for the well-being of cattle and their owner's wealth.

2.[95] sā́ṃ vaḥ sṛjatv aryamā́ / sā́ṃ pūṣā́ sā́ṃ bṛ́haspátiḥ / sā́m índro yó dhanaṃjayáḥ / máyi puṣyata yád vásu

Let Aryaman, let Pūṣan, let Bṛhaspati unite you,[96] let Indra, who is a winner of wealth, unite you; do you augment [97] my possessions.

b. MS 4.2.10*b* has *poṣā́* for *pūṣā́*. KS 35.3*b* has *dhātā* for *bṛ́haspátiḥ*.—*d.* AVP 2.13.1*d* reads *ihá puṣyati*. Raghu Vira [98] retains that reading. L. C. Barret [99] suggests the substitution of *puṣyata* as in AVŚ or Whitney's emendation *puṣyatu*.

5.28 [100] With an amulet of three metals to secure safety, prosperity, long life, etc.

3. tráyaḥ póṣās trivṛ́ti śrayantām / anáktu pūṣā́ páyasā ghṛténa / ánnasya bhūmā́ púruṣasya bhūmā́ / bhūmā́ paśūnā́ṃ tá ihá śrayantām

Let three abundances abide within the triple one,[101] let Pūṣan anoint with milk, with ghee. Plenitude of food, plenitude of man, plenitude of cattle—let these abide herein.

a. AVP 2.59.1 has *trivṛtaś*.—The three *póṣās* 'abundances,' are those enumerated in *cd*.—*c.* *Púruṣasya bhūmā́* probably is to be understood as 'fertility, the power to reproduce.'

12.[102] ā́ tvā cṛtatv aryamā́ / ā́ pūṣā́ bṛ́haspátiḥ / áharjātasya yán nā́ma / téna tvā́ti cṛtāmasi

Let Aryaman fasten thee on, let Pūṣan and Bṛhaspati fasten thee on. With that which is the name of the one born in the daytime do we fasten on.

b. The *pada*-text reads *ā́ pūṣā́ ā́ bṛ́haspátiḥ* and thus makes the verse a regular *anuṣṭubh*.—*cd*. In AVŚ 3.14.1 (= AVP 2.13.4), which is a charm to secure prosperity for cattle, the cattle are united by the sacrificer with the stall, with wealth, with well-being and with the name of the one born in the daytime. Lines *cd* read: *áharjātasya yán nā́ma / ténā vaḥ sā́ṃ sṛjāmasi*. In 3.14.2 (see

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is quoted is described in *Kāuś.* 33.1 ff. It is intended to procure safe and easy parturition, but the practices described throw no light upon the difficulties of the hymn.

[92] *Atharva-Veda Saṁhitā*, *HOS* 7.11 (Cambridge, Mass., 1905).

[93] *Hymns of the Atharva-Veda*, *SBE* 42.243-4 (Oxford, 1897).

[94] This hymn aims to secure prosperity in the stable for the sacrificer and is rubricated with 2.26; 7.75; 6.11.3 at *Kāuś.* 19,14 ff. in a series of *goṣṭhakarmāṇi* 'stable-rites.'

[95] In *Vāit.* 21.26 it is said that the institutor of the sacrifice in the *agniṣṭoma* recites this stanza as the cattle are driven out and properly arranged at the place of sacrifice.

[96] Lines *abc* are directly linked with the first stanza of this hymn, and the cattle are to be 'united' with the stable, wealth, well-being, etc. mentioned there.

[97] Whitney, *HOS* 7.109, renders differently: 'In my possession gain ye what is good,' but suggests in his note on page 110 *puṣyatu*, with *vasu* as subject, as a possible emendation.

[98] *Atharva Veda of the Pāippalādas* 28 (Lahore, 1936).

[99] *JAOS* 30.200 (1910).

[100] In *Kāuś.* 11.19 employed together with 1.9 and 1.35 in a ceremony to secure one's wishes and (52.20) to attain splendor.

[101] I. e. the amulet.

[102] This stanza is one of those recited in a ceremony to procure long life (*Kāuś.* 58.10,11).

above) Aryaman, Pūṣan, Bṛhaspati, and Indra are invoked to unite the cattle with those things just mentioned. It will be noticed that the first three divinities are also invoked here in this stanza. The meaning of *c* of both stanzas (i. e. 3.14.1 and 5.28.12) is obscure. *Aharjāta* has only these two occurrences in all Vedic literature. It has been rendered differently by various scholars. Whitney [103] sums up the views of Weber, Ludwig, Grill, and Roth, and says, 'none of these suits the other occurrence,' but offers no solution. Bloomfield,[104] following Weber,[105] states: 'Its opposite is *anaharjāta*, Śāṅkh. Śr. XIV, 51, 2-5. "born on an unlucky day" = *pāpanakṣatre jātaḥ*, Kāuś. 46, 25.' He remarks that the meaning 'auspicious' comes very near to the sense of our word. He translates [106] 3.14.1*cd*: 'with the name of that which is born on a lucky day do we unite you (O cattle).' T. Chowdhury [107] proposes that the word be taken as an epithet of Bhaga, descriptive of him as 'a morning deity, probably a particular aspect of the sun.' I suggest that in 3.14.1 the cattle are united, among other things, with the name of the auspiciously born householder in whose possession they are to prosper, and that in 5.28.12 the amulet of three metals is bound or fastened on together with the pronunciation of the name of the auspiciously born householder (who owns the amulet and wears it).

6.3 To different deities for protection.

1. pātáṃ na indrāpūṣaṇā / áditiḥ pántu marútaḥ / ápāṃ napāt síndhavaḥ sapta pātána / pātu no víṣṇur utá dyáuḥ

Protect us, O Indra and Pūṣan; let Aditi, let the Maruts protect us; O child of the waters, ye seven rivers, protect us; let Viṣṇu, also Heaven, protect us.

6.67 [108] A prayer for success against foes.

1. pári vártmāni sarvátaḥ / índraḥ pūṣā́ ca sasratuḥ / múhyantv adyámūḥ sénāḥ / amítrāṇāṃ parastarām

Indra and Pūṣan have gone along (i. e. made a complete circuit of) the roads in all directions. Today let those armies of [our] foes be thrown into confusion further away [from us].

ab. Whitney [109] explains: 'That is, to prevent access to our villages.'—RVKh. 5.2.2 (see J. Scheftelowitz, *Die Apokryphen des Ṛgveda* 133) has *eṣām* for *sarvátaḥ* and *cakratuḥ* for *sasratuḥ*. AVP 19.6.13 likewise has *eṣām* and has *tu* for *ca* in *b*.

6.73 [110] A charm to produce harmony in a tribal community.

3.[111] ihā́vá sta mā́pa yātādhy asmát / pūṣā́ parástād ápathaṃ vaḥ kṛṇotu / vástoṣ pátir ánu vo johavītu / máyi sajātā ramátir vo astu

Be right here; do not go away from us. Let Pūṣan make the [road] pathless (i.e. impassable) for you in the distance. Let the Genius of the home repeatedly call you back. In me, O kinsmen, let there be your contentment.

abcd. AVP 19.10.10 has *eha yāta m°* in *a*, *vo 'yam ahvan* in *c*, and *sujātā* in *d*.

6.112 [112] To expiate the offense of the marriage of a younger brother before an elder one.

3. yébhiḥ pā́śāiḥ párivitto víbaddhāḥ / áṅgeaṅga ā́rpita útsitaś ca / ví té muñcantāṃ vimúco hí sánti / bhrūṇaghní pūṣan duritā́ni mṛkṣva

[103] *HOS* 7.109.

[104] *SBE* 42.351.

[105] *Indische Studien* 17.244 (Leipzig, 1885).

[106] *SBE* 42.143.

[107] On the Interpretation of some Doubtful Words in the Atharva-Veda 44-5 (Reprint from the *Journal of the Bihar and Orissa Research Society* 17, 1930-1, Part I).

[108] Employed with 6.65 and 6.66 (*Kāuś.* 14.7), in a battle ceremony; also, with 6.98 (*Kāuś.* 16.4), in a similar ceremony to terrify foes.

[109] *HOS* 7.331.

[110] The charm appears to be undertaken by the tribal chieftain. It is rubricated with 3.12, 6.93, and 12.1 at *Kāuś.* 8.23 as belonging to the hymns to Vāstoṣpati. It is also reckoned as among the charms designed to produce harmony (*sāmmanasyāni*) at *Kāuś.* 12.5.

[111] This stanza is used at *Kāuś.* 23.6 in ceremonies connected with the building of a new house. In the present context it seems to be addressed by the patriarchal head to some of his quarreling kinsmen.

[112] This hymn together with 6.113 is used at *Kāuś.* 46.26-9 in rites that aim to remove sin from him whose younger brother marries first, as well as from the younger brother himself. (Apparently it was the custom in a family for the children to be married in order, according to seniority. See H. Zimmer, *Altindisches Leben* 315, Berlin, 1879). According to *Kāuś.*, loc. cit., both brothers, sitting near the water's edge, are bound with fetters of *muñja*-grass by the priest in charge of the rites, are sprinkled with bunches of grass soaked in the water and then rinsed. Other fetters are placed upon the foam of the river and are allowed to flow away,

Let these bonds with which the unmarried older brother [whose younger brother has married before him] has been shackled, has been bound and fettered limb by limb, be loosened; for they are subject to release (or 'fit for release'). O Pūṣan, wipe off the sins upon an abortionist.

abcd. Cf. AVP 1.70.4 which reads: *ebhiḥ pāśāir didhiṣūpatir*[113] *vibaddhaḥ / parāuparāv ārpito aṅge-aṅge / vi te cṛtyantāṃ vicṛto hi santi / bhrūṇaghni pūṣan duritāni sṛṣṭaṃ.* AVP 19.33.10 agrees with our passage (AVŚ 6.112.3) in *a* and with AVP 1.70.4 in *bcd,* except that in *d mṛṣṭhāḥ* occurs.—*c. Vimúco* may be nom. pl. or gen. sg.[114] It appears to be a play upon the preceding *ví . . . muñcatāṃ,* and, in the light of the following invocation of *Pūṣan,* to be reminiscent of Pūṣan's Rig-Vedic epithets *vimuco napāt,* 'son of liberation' (see RV 1.42.1; 6.55.1), and *vimocana,* 'liberator,' (see RV 8.4.15,16).—*d.* Pūṣan, in his rôle as liberator, is summoned to transfer the stain of guilt from the unmarried elder brother to a scapegoat, the one who practices abortion. The crime of abortion was considered to be most appalling. The abortionist is ranked along with the slayer of a Brahman in Vāsiṣṭha's *Dharmaśāstra* 20.23, and in MS 4.1.9 guilt is transferred from the gods to the divine scapegoats Ekata, Dvita, and Trita, from them to various unfortunate mortals, from them to various criminals, and finally to one who has committed abortion; here it resides, because guilt cannot pass beyond such a man.

6.113 To[115] expiate certain crimes.

2. márīcīr dhūmắn prá viśắnu pāpman / udārắn gachotá vā nīhārắn / nadīnāṃ phénāṅ ánu tắn ví naśya / bhrūṇaghní pūṣan duritắni mṛkṣva

O sin, enter the motes [that move in the sun's beams], enter smoke, go into fog or else mist, vanish on top of river-foam. O Pūṣan, wipe off the sins upon an abortionist.

a. Márīci is usually rendered as 'ray' by scholars. In my opinion the word here designates the dust-particles that appear in the sun's rays. This interpretation suits the following mention of 'smoke,' 'fog,' and 'mist' better than 'ray.' The guilt or sin is transferred to cloud-like phenomena that are subject to dispersion and consequent rapid disappearance. A. Weber[116] long ago proposed such a meaning for *márīci,* declaring: 'Das Wort *márīci* bedeutet ursprünglich eben nur den rasch verschwindenden Strahlendunst der Sonnenstäubchen, *tejastrasareṇavaḥ* ["dust particles moving in light"] Mah. zu Vs. 18,39 (Çat. 9,4,1,8. Ts. 3,4,7,1. Kāth. 18,14).'—AVP 19.33.12 has *dhūmaṃ* in *a, phenam ava* in *c,* and *mṛṣṭhāḥ* in *d.*—*d.* This line is a repetition of 6.112.3*d.*

7.33 To various deities for prosperity.

1. sáṃ mā siñcantu marútaḥ / sáṃ pūṣắ sáṃ bṛhaspátiḥ / sáṃ māyám agníḥ siñcatu / prajáyā ca dhánena ca / dīrghám áyuḥ kṛṇotu me

Let the Maruts, let Pūṣan, let Bṛhaspati, unite me, let Agni here unite me with offspring and wealth; let him provide me with a long life.

b. This line is identical with 3.14.2*b.*

11.6 To many gods for deliverance from misfortune.

3. (Cf. MS 2.7.13: 94.17-18) brūmó devắṃ savitắram / dhātắram utá pūṣắṇam / tváṣṭāram agriyáṃ brūmaḥ / té no muñcantv áṅhasaḥ

We address god Savitar, Dhātar, Pūṣan too; we address Tvaṣṭar who is foremost; let them deliver us from misfortune.

14.1 Marriage Rites.

15.[117] yád áyātaṃ śubhas patī / vareyắṃ sūryắm úpa / víśve devắ ánu tád vām ajānan / putráḥ pitáram avṛṇīta pūṣắ

When you two, O Lords of splendor (i. e. Aśvins), went to Sūryā to ask [her] in marriage, all the gods gave you their assent to this [proposal]. Pūṣan, as son, chose a father.

d. AVP 18.2.4 and RV 10.85.14 read *pitarāv avṛṇīta.* This is to be preferred. M. Bloomfield and F. Edgerton remark:[118] 'The original dual refers to the Aśvins; AV has a stupid simplifica-

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accompanied by a recitation of 6.113.2*cd,* and, as the foam vanishes, so does the sin. For an explanation of the fuller significance of 6.112 and 6.113 see M. Bloomfield, Trita, the Scape-Goat of the Gods, *AJP* 17.430-7.

[113] This word means 'husband of a widow remarried.'

[114] See Bloomfield, *SBE* 42.526.

[115] See note 112 to 6.112.

[116] *Indische Studien* 9.9 (Leipzig, 1865).

[117] *ab* of this stanza = RV 10.85.15*ab* and *cd* = RV 10.85.14*cd.*

[118] *Vedic Variants* 2 § 237.

tion,' and:[119] 'the singular of AV is secondary and may be due to a feeling that paternity should be single. . . .'

33.[120] imáṃ gāvaḥ prajáyā sáṃ viśātha / ayáṃ devānām ná mināti bhāgám / asmāi vaḥ pūṣā́ marútaś ca sárve / asmāi vo dhātā́ savitā́ suvāti

May you come to this man, O cattle, together with progeny. This man does not diminish the portion of the gods. For this man may Pūṣan and all the Maruts, for this man may Dhātar, Savitar, quicken you.

a. AVP 18.4.2 has *viśadhvam*.

39.[121] áśyāi brāhmaṇā́ḥ snápanīr harantu / ávīr-aghnīr úd acantv ā́paḥ / aryamṇó agníṃ páryetu pūṣan / prátīkṣante śváśura devárāś ca

Let Brahmans bring bath-water for her (i. e. the bride); let them draw the waters that do not harm heroes (i. e. water that purifies and is salutary). Let her go around Aryaman's fire, O Pūṣan. [Her] father-in-law and brother-in-law are looking on.

a. AVP 18.4.8 has *asyāi harantu snapanaṃ brāhmaṇā*. Ap.MP. 1.1.7 also has *snapanaṃ*.—*c.* AVP 18.4.8 has *pary eti kṣipraṃ* and Ap.MP. 1.1.8 has *pari yantu kṣipram*. Whitney[122] believes that the *kṣipram* 'quickly,' of these texts may indicate that *pūṣan* is a corruption for *oṣam* 'quickly.' Such an emendation is attractive. On the other hand, the invocation of Pūṣan as a god of the way functioning as a guide for the bride is appropriate enough in this situation. Furthermore we must compare AVŚ 1.11.1 where Aryaman and Pūṣan are closely associated (in a charm for easy childbirth) and RV 10.85.26 and AVŚ 14.2.38 (= RV 10.85.37) where Pūṣan as a god of the way and as guide, is asked to escort the bride on her way to her husband's home and to send her on for copulation with and impregnation by her husband.

[119] Op. cit. 3 § 775.

[120] In *Kāuś.* 79.17 this stanza and stanza 32 appear to be used as an accompaniment to the paying (in cattle) of the bride-price. Both stanzas express a wish for prosperity in cattle.

[121] The water that has been drawn for the bride is presented to her with this stanza according to *Kāuś.* 75.17. In 76.20 the second part of the stanza accompanies the leading of the bride three times around the fire.

[122] *HOS* 8.747.

16.9[123]

2. tád agnír āha tád u soma āha / pūṣā́ mā dhāt sukṛtásya loké

Agni says this, Soma, too, says this: may Pūṣan place me in the world of pious deed (i. e. heaven).

a. tád refers to the statement in stanza 1 of this hymn. See Bloomfield-Edgerton, *VV* 1 § 320.—*b.* MS 1.5.3*d*; 1.6.2*d* has *nā ā́dhāt*; KS 39.1 and TS 4.2.8.1*d* have *mā 'dhāt*. Whitney[124] suggests that our text ought to read *mā́ = mā ā́*.—AVP 18.29.2 has *loko* in place of *pūṣā́*.

18.2 Funeral verses.

53.[125] ágnīṣomā páthikṛtā syonám / devébhyo rátnaṃ dadhathur ví lokám / úpa préṣyataṃ pūṣáṇaṃ yó váhāti / ajayā́nāiḥ (better *añjoyā́nāiḥ*) pathíbhis tátra gácha[n]tam

O Agni and Soma, pathmakers, you two have meted out heaven to the gods as a pleasant gift. Send Pūṣan to [us] that he may conduct on straight-forward-leading (or possibly 'goat-trodden') paths him who goes thither (i. e. to heaven).

d. C. R. Lanman[126] sums up the evidence in support of the reading *añjoyā́nāiḥ* 'leading straight to the mark,' and makes out a very strong case for it. He concludes his note with the remark: 'If *añjoy-* is the true reading and *ajay-* the corrupt one, the corruption is a very natural one, considering that Pūṣan's team (see RV vi.55.6,4; 57.3; x.26.8; and the occurrences of *ajāçva*) consists of goats.'—I accept Whitney's emendation[127] of *gachatam* to *gáchantam*. This is suggested also by M. Lindenau.[128] The reference, then, is to the dead man who is going to heaven and who is to be conveyed by Pūṣan in his rôle as *psychopompos*.

19.20 Prayer for protection.

1. ápa nyàdhuḥ páuruṣeyaṃ vadháṃ yám / indrāgní dhātā́ savitā́ bṛ́haspátiḥ / sómo rā́jā váruṇo aśvínā / yamáḥ pūṣā́smā́n pári pātu mṛtyóḥ

[123] Hymns 5-9 of AVŚ 16 appear to be incantations that are to be recited for the warding off of nightmares.

[124] *HOS* 8.803.

[125] This verse along with 18.1.61; 2.48 et al. is used by *Kāuś.* 80.35 in preparation for the conveyance of the corpse to the funeral pile.

[126] *HOS* 8.844. [127] Ibid.

[128] *Atharva Veda Saṅhitā* xvii (revised edition of Roth-Whitney, Berlin, 1924).

They [129] have set aside the deadly weapon which is possessed (or perhaps 'used') by men.[130] Let Indra and Agni, Dhātar, Savitar, Bṛhaspati, king Soma, Varuṇa, the Aśvins [protect us from death]. Let Yama, let Pūṣan protect us from death.

a. For the syntax of *pắuruṣeyaṃ vadháṃ yám* cf. AVŚ 1.30.1*d* *méṃáṃ prắpat pắuruṣeyo vadhó yáḥ* and see W. Caland.[131]

19.51 [132] To accompany acceptance of an offering.

2. devásya tvā savitúḥ prasavè 'śvínor bāhúbhyāṃ pūṣṇó hástābhyāṃ prásūta ấ rabhe

At the impulse of god Savitar, with the arms of the Aśvins, with the hands of Pūṣan, I, impelled, take hold of thee.[133]

20.127 [134]

12.[135] iha gāvaḥ pra jāyadhvam / ihāśvā iha pūruṣāḥ / iho sahasradakṣiṇaḥ / api pūṣā ni ṣīdati

Multiply here, O cattle, [multiply] here, O horses, [multiply] here, O men.[136] Here let Pūṣan also settle down (i. e. seat himself), [the god] who grants a thousand [cattle] as sacrificial fee.

[129] I. e. probably the gods listed in *bcd*, or it is possible that the deities of *b* are subjects of *nyàdhuḥ*, while those of *cd* belong to *pári pātu*. Sāyaṇa suggests 'enemies' as a subject for *a*.

[130] The gods have taken the weapon away so that it cannot be used against the reciters of this prayer.

[131] *KZ* 34.456 (1897).

[132] The two stanzas of this prose hymn are cited by *Kāuś.* 91.3 in the *madhuparka* ceremony as being used to accompany the acceptance of the offering.

[133] I. e. the offering. Cf. AVP 5.40.1; 16.70.1.

[134] This is the first of the so-called *kuntāpa* hymns. For a full account of them see M. Bloomfield's *The Atharvaveda* 96-101 (in G. Bühler's *Grundriss der Indo-Arischen Philologie und Altertumskunde* II. Band, I Heft, B., Strassburg, 1899), and for a detailed treatment of 20.127 see as well M. Bloomfield, *SBE* 42.197-8; 688-92.

[135] Stanzas 11, 12, 13, 14 by themselves form a separate section of this hymn and are designated by the liturgical literature as verses *kāravyāḥ* 'pertaining to the poet.' In stanza 11 Indra exhorts the priestly bard to sing his praises, and promises the bard rewards in return, namely, abundant sacrificial fees from all the pious. The singer makes his laud (in stanzas 12, 13, 14), the greater part of which is expressive of his anticipatory delight in the rewards promised.

[136] Bloomfield (*SBE* 42.198), renders 'domestics.' I suggest as another possibility 'descendants.' Cf. *púruṣasya bhūmā́* in AVŚ 5.28.3*c*.

ab. For a similar prayer, addressed to cattle only, cf. AVŚ 3.14.4,5.—*d.* Several of the liturgical texts have *ṣīdatu*. *Ṣīdati* is the 'hortative indicative' mentioned by Bloomfield-Edgerton.[137]

3. Below are presented the text, translation, and exegesis of certain verses and certain portions of prose hymns in the Pāippalāda recension of the Atharva Veda in which the god Pūṣan is mentioned. Only those passages which appear in no other Saṃhitā-text are treated. No complete hymn addressed to the god is to be found.

1.34 [138]

3. pūṣā jñātivin mahyaṃ jāyām imām adāt

Pūṣan,[139] who bestows kinsfolk, has given me this woman as wife.

a. Pūṣan is *jñātivin* 'bestower of kinsfolk,' because, in bringing a bride to a man, the god also brings the man the bride's relatives which now become his relatives. Cf. Ś.G. 1.9.9: . . . *pūṣā jñātimān sa mā 'muṣyāi pitrā matrā bhrātṛbhir jñātimantaṃ karotu*. . . . For Pūṣan's close connection with the marriage ceremony and the bride see RV 10.85.37 (= AVŚ 14.2.38) and AVŚ 14.1.39.

1.35 [140]

3. pūṣṇe jñātivide svāhā

To Pūṣan, bestower of kinsfolk, hail!

1.40 (= Kāuś. 133.3)

1. mamobhā mitrāvaruṇā / mamobhendrābṛhaspatī / mama tvaṣṭā ca pūṣā ca / mamāiva savitā vaśe

[May] both Mitra and Varuṇa, both Indra and Bṛhaspati, both Tvaṣṭar and Pūṣan, and likewise Savitar [be] [141] in my power.

2.61

5. anātureṇa varuṇ* *the no / svastibhir ati durgāṇi veṣyat / tam aśvinā pratigṛhyā svast[aye]/ doṣavena pūṣā me saṃ pra yacchāt

[137] *VV* 1.66.

[138] This is made up of formulae that appear in *Kāuś.* 78.10.

[139] Agni, Soma, and Indra in verses 1, 2, and 4 respectively play the same rôle as Pūṣan does here.

[140] Like AVP 1.34, found in *Kāuś.* 78.10.

[141] A *bhuvan* or *bhavan* is to be supplied for this stanza from the succeeding stanzas.

Together with one who is healthy may Varuṇa . . . conduct us with good fortune beyond difficulties. May the Aśvins from whom gifts are to be received [give] him to me [in marriage] for the sake of my well-being, may Pūṣan give him to me [in marriage] along with freedom from sin.

a. Probably *anātureṇa* refers to the same person as *asya* of *cd* of the preceding stanza which read: *pravidvān* *mumugdhi pāśān / asya*[142] *patnī vidhavā yathāsat* ('Dost thou[143] who are wise . . . loose the bonds in order that the widow may be the wife of this man') and which seem to be an invocation of divine sanction for a widow's remarriage.—Perhaps *no* is to be taken as *nas,* possibly with the meaning of *mā* (acc. sg. of *aham*).—*b.* Barret[144] conjectures *vikṣat* for *veṣyat.* I suggest and translate *neṣat.*—*c.* Presumably *tam* is identical with the person of *anātureṇa* in *a.*—It may be that *aśvinā pratigṛhyā* is in the vocative, but I have preferred to regard it as nominative and to supply the verb from *d.*—*d. doṣavena* makes no sense. I can only suggest and translate *adoṣena* 'lack of guilt or sin; lack of damage, harm, or bad consequences,' which is not too satisfactory.[145]—It will be apparent that the interpretation of this stanza is largely conjectural. So too with the whole hymn. The first half of it (probably 2½ stanzas) is missing entirely and the text of the remainder is replete with questionable forms and lacunae.

2.72

2. tvaṣṭā rūpeṇa savitā savena ahar mitreṇa varuṇena rātrī pūṣā puṣṭibhir bhāgadheyena bhāgadhā idaṃ rāṣṭraṃ vardhayantu prajāvat

Let Tvaṣṭar by splendor, let Savitar by vivification, let Day by Mitra, let Night by Varuṇa, let Pūṣan by increases, let Portion by apportionment, make this fruitful land prosper.

2.80

2. tvaṣṭā rūpeṇa savitā savena ahar mitreṇa varuṇena rātrī indro jyeṣṭhena brahmaṇātha bṛhaspatiḥ pūṣāsmāi punar asuṃ dadātu

Let Tvaṣṭar by splendor, let Savitar by vivification, let Day by Mitra, let Night by Varuṇa, let Indra by highest *brahma* (i. e. spiritual exaltation), let Bṛhaspati also, let Pūṣan, give again to this man his life's spirit.

4.3

7. dyāuś ca tvā pṛthivī ca pracetasā / śukro bṛhad dakṣinā pipartu / anu svadhā cikitām somo 'gniṣ / pūṣā tvāvatu savitā savena

Let wise Heaven and Earth, let the Light on high, let the Sacrificial Fee, protect thee. Let Soma and Agni care for [thee] according to their want. Let Pūṣan favor thee, let Savitar [favor thee] by his power to vivify.

bcd. KS 37.9 has *yajño* for *śukro, cikite* for *cikitāṃ,* and *anu* for *pūṣā.*

5.26

7. bhavo rājā bhavāśarvāu / indro vāyur bṛhaspitiḥ / tvaṣṭā me 'dhyakṣaṣ pūṣā / te 'rātiṃ ghnantu suvratāḥ

Let King Bhava, let Bhava and Śarva, let Indra, Vāyu, Bṛhaspati, let Tvaṣṭar, let Pūṣan the overseer, let [all] these, who rule well, slay the demon of avarice for me.

a. bhavāśarvaū: well-known aspects of Rudra-Śiva.

5.40

1. devasya tvā savituṣ prasave aśvinor bāhubhyāṃ pūṣṇo hastābhyāṃ prasūto brāhmaṇebhyo nirvapāmi sa me mā kṣeṣṭa madam iṣyamāṇaḥ

At the impulse of God Savitar, with the arms of the Aśvins, with the hands of Pūṣan,[146] I, impelled, offer thee[147] to the Brahman-priests. Let that which promotes exhilaration be not destroyed for me.

9.12

6-7. vāyus satye 'dhiśritaḥ / prāṇāpānāv abhirakṣan / pradadad āyur eti māṃ / devā yatāḥ prajāpatā / ta ādityāś ca yemire / pūṣā raśmiṣu

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[142] Suggested by Raghu Vira, *Atharva-Veda of the Pāippalādas* 40, for *pāśānyasya.*

[143] The reference is to a *nadīnāṃ patye* of *b* of this stanza, i. e. probably Varuṇa.

[144] *JAOS* 30.235 (1910).

[145] See, however, AVP 1.70.4 where the prayer is made that the husband of the remarried widow (*didhiṣūpatir*) shall be released from the fetters which bind him, and that Pūṣan shall transfer *duritāni* 'sins, misdeeds' to an abortionist serving as a scapegoat. See also my comments and notes upon AVŚ 6.112.3.

[146] Cf. AVŚ 19.51.2 and AVP 16.70.1.

[147] I. e. a rice-offering (*odana*).

yataḥ / ādityo viṣṇur ākrame / svā rohan divaṃ rohati

Vāyu, fastened in the truth, protecting inhalation and exhalation, granting long life, comes to me. The gods are supported on Prajāpati, and the Ādityas are self-supporting. Pūṣan is supported on [his] rays; the Āditya Viṣṇu in his approach, self-rising, ascends heaven.

d. Barret[148] suggests *prājāpatyāḥ.*—*e.* Both Barret[149] and Raghu Vira[150] read *sādityāś.*

12.6

6. dhātā pūṣā bṛhaspatir / bhūmyās samajīm akran / kṛṣiṃ devās svarvidaḥ / kalyāṇī subhageva yā

Dhātar, Pūṣan, and Bṛhaspati have effected *samajīm* of the earth; the gods who are dispensers of light [have effected] Kṛṣi, [a goddess] who is beautiful, [who is] quite lovely.

b. I cannot solve *samajīm.* Either the text is corrupt or the word is a *hapax legomenon* whose meaning is unknown. Barret[151] suggests *samīcīm* as a possibility. Raghu Vira[152] makes no suggestion or emendation. This stanza occurs in a hymn which asks for success in agriculture and bears a close relationship to AVŚ 3.17. It may be that *samajīm* or its uncorrupted source has some such meaning as 'sowing,' 'seeding,' or perhaps 'fecundity,' or that possibly it is a synonym for *kṛṣi* of *c.*—*c. kṛṣi* is here the personification of plowing, of cultivation of the soil. Cf. *kṛṣiṃ devīm* in stanza 2 of this hymn.

12.7[153]

7. varco vāi nāmāitā āpo yad ghṛtaṃ tāsāṃ pūṣādhipatiḥ yo vā etā varca āpo veda pūṣāṇam adhipatiṃ varcasvī tejasvī bhavati etasyān ity uktasya mukhaṃ rocate adhipatir bhavati svānāṃ cānyeṣāṃ ca ya evaṃ veda

'Vigor,' certainly, by name are these waters, waters which are ghee. Their master is Pūṣan. Whoever knows these waters as vigor, [whoever knows] Pūṣan as [their] master, he becomes one who possesses vigor, one who possesses power. The countenance of the one addressed as *etasyān*[154] shines. Whoever has this knowledge is master of his own and of others.

13.14

2. dhātū rudrasya kiṃ vāyoḥ / vājināṃ vṛjanaṃ mahat / kiṃ pūṣā brahmaṇaspatir / visvé devāś ca bibhrati

What is the great garment of Dhātar, of Rudra, of Vāyu, of the powerful ones? What do Pūṣan, the Lord of Prayer, and all the gods wear?

ab. Cf. stanza 1 of this hymn: *kim indrasya parihitaṃ kim agnes / kiṃ . . . vāsaḥ / . . . / kiṃ vasānā maruto varṣanti,* and also stanza 3*a*: *kiṃ devānāṃ paridhānaṃ* etc.

15.8[155]

8. pūṣā patīnām adhyakṣaḥ / sa māvatv asmin brahmaṇy asmin karmaṇi / asyāṃ purodhāyām asyāṃ devahūtyām / asyām ākūtyām asyām āśiṣi svāhā

Pūṣan is overlord of lords. Let him favor me in this devotion, in this rite, in this office of Purohita, in this invocation of the gods, in this intent, in this benediction. Hail!

bcd. These lines are common to all stanzas of the hymn.

16.70

1. dyāur javena pṛthivī varimṇāntarikṣaṃ mahitvāpo bhūmnā devasya tvā savituṣ prasave 'śvinor bāhubhyāṃ pūṣṇo hastābhyāṃ prasūtaṃ brāhmaṇebhyo nir vapāmi

Heaven with its swiftness, the Earth with its expanse, the Atmosphere with its greatness, the Waters with their abundance, [make offering of thee]. At the impulse of God Savitar, with the arms of the Aśvins, with the hands of Pūṣan, I offer thee, who art impelled, to the Brahman-priests.[156]

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[148] *JAOS* 42.124 (1922).

[149] Loc. cit.

[150] Op. cit. 128.

[151] *JAOS* 46.44 (1926).

[152] *AV of the Pāippalādas* 151.

[153] This prose hymn of 14 stanzas is addressed to the Waters, describing their various aspects and functions and listing the various divinities assigned as *adhipatayas* of them, including Agni, the Ādityas, Pṛthivī, Varuṇa, Tvaṣṭar, Indra, Pūṣan, the Maruts, Parjanya, the Aśvins, Yama, Kāma, etc.

[154] I cannot solve *etasyān.* Neither Raghu Vira, *AV of the Pāippalādas* 152, nor Barret, *JAOS* 46.47 (1926), has any suggestion.

[155] Cf. AVŚ 5.24.

[156] For the second part of this stanza see note to AVŚ

17.21 [157]

5. indrāgnibhyāṃ prajāpataye parameṣṭhine somāya rājñe varuṇāya rājñe pūṣṇe dhātre savitre tvaṣṭre amum āmuṣyāyaṇam amuṣyāṣ putram ā vṛścāmi

For Indra and Agni, for supreme Prajāpati, for king Soma, for king Varuṇa, for Pūṣan, for Dhātar, for Savitar, for Tvaṣṭar, I hew down so-and-so who is of such-and-such lineage, the son of such-and-such a woman.

17.26 [158]

14. devaṣ pūṣā vahad duṣvapnyaṃ parā vahad duṣvapnyam amuṣyāmuṣyāyaṇasyāmuṣyāṣ putrāya pra hiṇma

May the god Pūṣan carry bad dreams [away], may he carry bad dreams [far] away. May we send [them] forth to the son of such-and-such a woman and of such-and-such a man who is of such-and-such lineage.

19.22

13. tvaṣṭeva pūṣā sūryo damūnāḥ / mayi svastir dhṛṣānā nāma / viśvāṣāṭ sūyavasas saṃrarāṇaḥ / asyā rayyāṣ puraetā na edhi

Like Tvaṣṭar [let] Pūṣan [and] Sūrya [be] friends of the household. Prosperity [be] mine, O ye who are called 'daring.' Possessing good pasturage, bestowing liberally, fearlessly be a leader, as it were, of this wealth.

20.2

6. dhātā rātis savitedañ juṣantām / prajāpatir nidhipatir no agniḥ / tvaṣṭā pūṣā prajayā samrarāṇāḥ / yajamānāya draviṇaṃ dadhātu

Let Dhātar, Rāti, Savitar enjoy this; let Prajāpati, Agni, lord of our treasure, Tvaṣṭar, Pūṣan, bestowing liberally with offspring, grant wealth to the sacrificer.

20.25

5.[159] tan no deva savitar / jagadrātrī ca rakṣatam / pūṣāinat punar ājatu / aviliṣṭaṃ mahivratam

O God Savitar and World and Night, protect this for us. Let Pūṣan bring it back intact and in full vigor.

20.29

6ab. mediṃ dhātā mediṃ pūṣā / medim indro dadhātu me

Let Dhātar grant me wisdom, let Pūṣan grant me wisdom, let Indra grant me wisdom.

ab. Cf. RV Kh. 10.151.1,2 which has *medhām* for *medim.*

20.36

2.[160] triśṛṇgam asi dravyad †harṣim indrāya 'śrīyate / pūṣā te prāśitaṣ prehi no agne tanvaṃ pāhi †gāhyāśvā no kṛtam / ahutādāv amartyāu tāv asmān pātam aṅhasaḥ

9. pūṣā purastād āvartayatu / catasro bhumyā uta / sagaliga pūṣaliga / punar no naṣṭam ā kṛdhi / jīvenābhi nudāvahe

a. Cf. RV 6.54.10*a.*—*b.* This is AVŚ 1.11.2*b.*—*d.* This has the same meaning as RV 6.54.10*c.*

INDEX OF SAMHITĀ REFERENCES TO PŪṢAN

SĀMA VEDA

1.1.2.3.3 (1.75) = RV 6.58.1; 1.2.2.1.4 (1.148) = RV 6.57.4; 1.2.2.1.10 (1.154); 1.3.1.1.9 (1.202) = RV 6.57.1; 1.5.1.5.1 (1.427 = 2.717) = RV 9.109.1; 1.6.2.1.2 (1.546 = 2.168) = RV 9.101.7; 2.2.1.16.1 (2.168 = 1.546) = RV 9.101.7; 2.4.1.13.3 (2.433) = RV 9.61.9; 2.6.1.8.1 (2.717 = 1.427) = RV 9.109.1; 2.7.3.11.1 (2.943) = RV 6.53.10; 2.9.3.9.3 (2.1225) = RV 1.89.6.

YAJUR VEDA

Tāittirīya Saṃhitā [161]

*1.1.2.2[n]; *1.1.4.2[m]; 1.1.6.1[f] (cf. 1.1.4.2[m]);

19.51.2 and also cf. AVP 5.40.1 which, like this one, is the opening stanza of a hymn that concerns an offering of rice (*odana*).

[157] This incantation seems to be directed against an enemy. In stanza 1 Agni is invoked to devour the blood, flesh, skin, bones, etc. of so-and-so etc.

[158] The phraseology of all 21 stanzas of this charm-hymn against bad dreams is practically identical save for the substitution of a different deity or deities in each stanza.

[159] This stanza occurs in a piece that seems to be a charm for the regaining of vitality and virility.

[160] I can make very little of this passage or of 9. I give the texts as read by Barret, *The Kashmirian Atharva Veda, Books Nineteen and Twenty* 129 (New Haven, 1940).

[161] Controlled through A. B. Keith's English translation of the *Tāittirīya Saṃhitā* (*HOS* 18-19). The asterisk indicates a passage which occurs neither in the RV or SV. If a passage of this sort is repeated in TS, the second and following occurrences receive no asterisk.

*1.1.7.2[k] = 1.5.10.3[l],4[l]; 1.1.14.2[e] (cf. RV 6.53.1); 1.1.14.2[f] (cf. RV 6.49.8); *1.2.2.1[a] (cf. 6.1.2.1-2); *1.2.3.2[e]; *1.2.4.2[i] (cf. 6.1.7.6); 1.3.1.1[a] (cf. 1.1.4.2[m]); *1.3.10.1-2[h]; 1.3.14.1[a] (cf. RV 2.1.6); 1.5.10.3[l],4[l] = 1.1.7.2[k]; 1.7.10.3[h] (cf. 1.1.4.2[m]); *1.7.11.1; 1.8.7.2[g] (cf. 1.1.4.2[m]); *1.8.12.2[g]; *1.8.13.3[h] (cf. 7.1.16.1); 1.8.22.5[q,r] (cf. RV 2.40.1,2); *2.4.5.1[b] (cf. AVP 1.39.2); 2.6.4.1 (cf. 1.1.4.2[m]); 2.6.11.4[w,x] (cf. 1.8.22.5[q,r]); *3.3.9.1-2[c]; 4.1.1.3[k] (cf. 1.1.4.2[m]); *4.1.2.2[f] (cf. 5.1.2.4); 4.1.3.1[a] (cf. 1.1.4.2[m]); 4.1.11.2[l] (cf. RV 6.54.5); 4.1.11.2-3[m] (cf. RV 6.58.1); *4.2.5.6[t]; *4.2.8.1[a] (cf. AVŚ 16.9.2; AVP 18.29.2); *4.3.9.1[e]; *4.3.10.2; *4.4.9.1; *4.4.10.3[b]; 4.6.3.3[h,k] (cf. RV 10.139.1,2); 4.6.6.4[k] (cf. RV 6.75.10); 4.6.8.1[b,c],2[d] (cf. RV 1.162.2-4); *4.7.6.1; *4.7.7.2; 5.1.2.4 (cf. 4.1.2.2[f]); *5.5.12.1; *5.5.22.1; *5.5.24.1; *5.6.12.1; *5.6.13.1; *5.6.14.1; *5.7.17.1; 6.1.2.1-2 (cf. 1.2.2.1[a]); 6.1.7.6 (cf. 1.2.4.2[i]); 6.2.10.1 (cf. 1.1.4.2[m]); 6.3.6.3 (cf. 1.1.4.2[m]); 6.4.4.1; 7.1.11.1[a] (cf. 1.1.4.2[m]); 7.1.16.1 (cf. 1.8.13.3[h]); *7.3.15.1; *7.5.21.1.

Kāṭhaka Saṃhitā [162]

1.2: 1.6; 1.4: 2.14; 1.5: 2.19; 1.7: 3.23-4; 1.8: 4.1; 1.9: 4.9; 2.2: 8.19; 2.4: 10.9; 2.5: 10.21; 2.9: 14.7; 2.11: 16.5; 2.12: 17.1; 3.3: 24.1; 3.5: 25.7; 3.7: 26.7; 3.10: 28.12-13; 4.15: 40.17-20 (cf. RV 6.54.5; 6.58.1); *5.1: 44.12-13 (cf. 32.1: 19.9); *6.8: 58.1-2; *7.2: 64.10-11 (cf. 7.9: 71.12-13); *7.3: 65.1-2; 7.9: 71.12-13 (cf. 7.2: 64.10-11); 8.17: 102.20-1 (cf. RV 2.40.1,2); 9.4: 107.4,6; 9.5: 108.7; 9.9: 111.4; *9.10: 112.7,8; 9.19: 123.12-13 (cf. RV 9.101.7); *11.12: 159.15-16; 13.9: 191.16-17; *14.2: 202.1-2; 14.4: 203.6,12,21-2; 14.8: 207.21; 15.2: 210.17; 15.7: 213.22; 16.1: 221.1,17; 16.3: 222.19; 16.12: 234.18; 17.4: 248.12; 17.5: 249.2-3; 18.3: 267.10-11,14-15 (cf. RV 10.139.1,2); 18.10: 272.15; 19.2: 2.11; 20.15: 35.22 (cf. RV 6.54.5*a*; 58.1*a*); 21.1: 37.8; 23.2: 75.3; 23.6: 81.18-19; 23.11: 87.7-10 (cf. RV 6.57.1,4); 24.3: 92.9; 27.1: 139.6; *29.1: 168.6-11 (cf. RV Kh. 5.7.4,a-c); 31.1: 2.5-6; 31.6: 7.19; 32.1: 19.9 (cf. 5.1: 44.12-13); 34.14: 46.4; 35.1: 50.9-10 (cf. RV 1.89.6); *35.2: 51.14-15 (cf. 9.10: 112.7); *35.3: 52.1-3; 38.4: 104.20,22,23; *38.10: 111.19-20; 38.12: 113.21, 114.2; 39.1: 117.9-10; 39.4: 122.19; 39.13: 131.7; 40.6: 140.5; 40.9: 143.12.

Kāṭhaka Saṃhitā, Aśvamedha-Grantha [163]

1.2; 1.5; 1.7; 3.5; 5.18; 6.1; 6.4; 7.2; 8.1; 8.3; 9.2; 9.3; 9.4; 13.7.

Kapiṣṭhala-Kaṭha-Saṃhitā [164]

1.2: 4.1-2; 1.4: 4.15-16; 1.8: 6.5-6,12-13; 1.14: 10.17-18; 1.16: 12.11; 1.17: 13.8; 2.3: 16.8; 2.5: 17.17; 2.6: 18.9; 2.10: 20.4; 2.12: 21.10; 2.14: 22.13-14; 2.17: 24.15; 4.7: 46.3-4; 5.2: 51.1-2,15; 5.8: 57.1-2; 8.7: 85.11,13; 8.8: 86.8; 8.12: 88.13; 25.3: 96.9; 26.3: 106.20; 26.4: 107.11; 28.3: 123.14-15; 28.10: 127.22; 29.2: 130.4-5; 29.8: 136.18; 35.8: 184.12; 37.4: 197.16; 42.1: 247.16; 45.2: 268.21; 47.1: 285,2; 48.3: 297.20-1; 48.4: 298.5-7.

Māitrāyaṇī Saṃhitā [165]

1.1.2: 1.8; 1.1.2: 2.2; 1.1.5: 3.3; 1.1.8: 4.15; 1.1.9: 4.16; 1.1.9: 5.11; *1.1.12: 7.9; 1.2.2: 10.12; 1.2.3: 12.9; *1.2.3: 12.11; 1.2.4: 13.5; 1.2.10: 19.4; 1.2.15: 24.10; 1.2.17: 27.3; 1.3.3: 30.12; 1.5.3: 69.14; 1.5.4: 71.8-9; 1.5.11: 80.4-5; 1.5.14: 83.5,17; 84.10; 1.6.2: 87.2; 1.8.5: 122.1; 1.9.2: 132.3-4; 1.9.4: 133.13; 1.10.1: 140.9,11; 141.2,4; 1.11.4: 165.7; 1.11.10: 171.15; 172.1,12; 173.4; 2.5.10: 61.13; 2.6.3: 65.2; 2.6.9: 69.5; 2.6.11: 70.8; 2.6.13: 72.9; 2.7.1: 74.12; 2.7.2: 75.8; 2.7.2: 76.12; *2.7.12: 91.11-12; 2.7.13: 94.17 (cf. AVŚ 11.6.3); 2.7.14: 95.11; 2.8.5: 109.13; 2.8.6: 110.

[162] Controlled by R. Simon's *Index Verborum* (Leipzig, 1912). The numbers after the colon refer to the page and line of L. von Schroeder's *Kâṭhakam, Die Saṃhitâ der Kaṭha-Çâkhâ* (3 books, Leipzig, 1900-10). The asterisk indicates first occurrence of a passage that does not occur in the RV, SV, or TS.

[163] Controlled by Simon's *Index Verborum*. None of the passages here listed is new material.

[164] Partially controlled through H. Oertel's article Zur Kapiṣṭhala-Kaṭha-Saṃhitā, *Sitzungsb. d. Bay. AK. d. Wissen.*, Ph-H. Abt., Heft 6, 1-141 (1934), and through Raghu Vira's *Kapiṣṭhala-Kaṭha-Saṃhitā* (Lahore, 1932). The Kap. S. possesses no Pūṣan passages which do not appear in some other Saṃhitā. The numbers after the colon in every case refer to page and line in the edition of Raghu Vira.

[165] Partially controlled by M. Bloomfield's *Vedic Concordance*. Most of these passages are paralleled in some other Saṃhitā. Some few are original to MS. It was possible to locate these original passages only when the line began with some form of the god's name or with some epithet commonly applied to him. It is quite probable, then, that some new material has been overlooked. Its extent is probably very small and its importance (as far as its effect upon the total picture of the god is concerned) relatively slight. The asterisk indicates first occurrence of a passage which is not to be found in the RV, SV, TS, or KS.

16; 2.10.5: 137.3-5,11-13 (cf. RV 10.139.1,2); 2.11.5: 142.13; 2.13.4: 163.12; 2.13.20: 166.8; 3.3.8: 41.1 (cf. RV 10.139.1*c*); 3.4.3: 47.8; 3.6.4: 64.1; 3.6.9: 73.6; 3.7.6: 82.6; 3.8.8: 105.17; 3.9.6: 124.1; 3.10.6: 137.16; 3.11.8: 151.6; 3.11.11: 158.4; 3.12.5: 162.3-4; 3.13.8: 170.5; 3.13.12: 171.1; 3.13.13: 171.4; 3.13.15: 171.10; 3.13.16: 171.13; 3.14.13: 175.3; *3.15.3: 178.10; *3.15.4: 179.1; 3.15.9: 180.4; 3.16.1: 181.9-182.3 (cf. RV 1.162.2-4); 3.16.3: 186.15-16 (cf. RV 6.75.10); *4.1.1: 2.6; 4.1.2: 2.12; 4.1.2: 3.8; 4.1.2: 3.18; 4.1.4: 6.6; 4.1.5: 6.18; 4.1.8: 10.14; 4.1.9: 10.16; 4.1.10: 12.13; 4.2.10: 33.8; 4.4.3: 53.2; 4.5.4: 68.8; 4.9.1: 120.5; 4.9.7: 127.4; *4.9.7: 127.8; 4.9.9: 129.11; 4.9.27: 140.1 (cf. RV 1.89.6); 4.10.3: 150.2-3 (cf. RV 6.54.5); 4.10.3: 150.4-5 (cf. RV 6.58.1); 4.11.1: 160.2 (cf. RV 6.54.5*a*); 4.11.2: 163.14-164.2 (cf. RV 2.40.1-2); 4.12.6: 196.3 (cf. RV 6.57.1); *4.12.6: 198.4-5; *4.12.6: 198.6-7; 4.14.1: 214.11; 4.14.16: 243.8-9 (cf. RV 6.58.3); 4.14.16: 243.10 (cf. RV 6.58.1*a*); 4.14.16: 243.11-14 (cf. RV 10.17.5,6); 4.14.16: 243.15-244.1 (cf. RV 6.58.4); 4.14.16: 244.2-3 (cf. RV 6.58.2).

Vājasaneyi Saṃhitā
(in the Madhyaṃdina Śākhā) [166]

1.10; 1.21; 1.24; 2.11; 4.7; 4.19; 5.22,26; 6.1; 6.9; 6.18; 6.30; 8.54; 9.29; 9.30; 9.32; 9.38; 10.5; 10.9; *10.30; 11.9; 11.15; 11.28; 12.72; 14.25; 14.30; 17.58,59 (cf. RV 10.139.1,2); 18.16; 18.37; 20.3; 21.15; 22.20; *24.1; 24.7,14; 24.32; 25.3; 25.5; 25.7; 25.18,19 (cf. RV 1.89.5,6); 25.25,26, 27 (cf. RV 1.162.2-4); *28.27; 29.47 (cf. RV 6.75.10); 29.58; 29.59; 33.44 (cf. RV 7.39.2); 33.45 (cf. RV 1.14.3); 33.48,49 (cf. RV 5.46.2,3); 34.34 (cf. RV 7.41.1); 34.41 (cf. RV 6.54.9); 34.42 (cf. RV 6.49.8); 36.11 (cf. RV 7.35.1); 37.1; 38.1; *38.3; *38.15; *39.5.

Vājasaneyi Saṃhitā (in the Kāṇva Śākhā) [167]

40.15; 40.16.

[166] Controlled by Vishweshvaranand-Nityanand, *A Complete Alphabetical Index of All the Words in the Yajur-Veda* (Bombay, 1908). The asterisk indicates first occurrence of a passage which is not to be found in the RV, SV, TS, KS, or MS.

ATHARVA VEDA

Śāunakīya

1.9.1; 1.11.1; 3.14.2 (AVP 2.13.1); 3.16.1 (AVP 4.31.1) = RV 7.41.1; 3.17.4 (AVP 2.22.5) = RV 4.57.7; 4.30.6 = RV 10.125.2; 5.28.3,12 (AVP 2.59.1,11); 6.3.1; 6.67.1 (cf. RV Kh. 5.2.2); 6.73.3; 6.112.3 (cf. AVP 1.70.4; 19.33.10); 6.113.2; 7.9.1,2 = RV 10.17.6,5; 7.9.3 = RV 6.54.9; 7.9.4 (*abc* = *abc* of RV 6.54.10); 7.33.1 (AVP 6.18.1); 11.6.3; 14.1.15 (AVP 18.2.4), *ab* = RV 10.85.15*ab*, *cd* = RV 10.85.14*cd*; 14.1.33 (AVP 18.4.2); 14.1.39 (AVP 18.4.8); 14.2.38 (AVP 18.10.9) = RV 10.85.37; 16.9.2; 18.2.53; 18.2.54, 55 = RV 10.17.3,4; 19.10.1,9 (AVP 13.8.1.9) = RV 7.35.1,9; 19.20.1; 19.51.2; 20.127.12.

Pāippalāda

1.34.3; 1.35.3; 1.39.2 (in TS 2.4.5.1); 1.40.1; 1.70.4 (cf. AVŚ 6.112.3, AVP 19.33.10); 2.13.1; 2.22.5 (AVŚ 3.17.4) = RV 4.57.7; 2.59.1,11 (AVŚ 5.28.3,12); 2.61.2; 2.72.2; 2.80.2; 4.3.7 (cf. KS 37.9); 4.28.4 = RV 1.106.4; 4.31.1 (AVŚ 3.16.1) = RV 7.41.1; 5.26.7; 5.40.1; 6.18.1 (AVŚ 7.33.1); 9.12.7; 12.6.6; 12.7.7; 13.8.1,9 (AVŚ 19.10.1,9) = RV 7.35.1,9; 13.14.2; 15.8.8; 15.10.10 = RV 6.75.10; 16.70.1; 17.21.5; 17.26.14; 18.2.4 (AVŚ 14.1.15) *ab* = RV 10.85.15*ab*, *cd* = RV 10.85.14 *cd*; 18.4.2 (AVŚ 14.1.33); 18.4.8 (AVŚ 14.1.39); 18.10.9 (AVŚ 14.2.38) = RV 10.85.37; 19.1.13*ab* = RV 5.46.3*cd*; 19.1.14*a* (AVŚ 6.3.1*a*); 19.6.13 (AVŚ 6.67.1); 19.10.10 (AVŚ 6.73.3); 19.22.13; 19.29.3 = RV 10.59.7; 19.33.10 (cf. 1.70.4 and AVŚ 6.112.3); 19.33.12 (AVŚ 6.113.2); 20.2.6 (cf. AVŚ 7.17.4); 20.25.5; 20.29.6; 20.36.2,9; 20.43.3 (cf. RV 6.54.10 and AVP 20.36.9); 20.53.10 (cf. AVŚ 19.51.2).

[167] Partially controlled by Bloomfield's *Vedic Concordance*. The same technique has been employed here as in the case of MS. Also a careful examination has been made of the VSK variants which Weber lists at the end of each section in Part I of his *The Vâjasaneyi-Sanhitâ* (Berlin, 1852). Only material occurring in no other Saṃhitā is listed above.

LINGUISTICS IN HISTORY *

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IF LINGUISTS are often amazed at the lack of critical evaluation of linguistic data in works on history, this is not surprising. For historical identifications, even by such distinguished Orientalists as Chavannes and Pelliot, have often rested on little more than real or fancied resemblances of names. The historian has generally failed even to estimate the probabilities for such identifications.

Pelliot has stated [1] that "in 381, sixty-two kingdoms of the Northeast and Central Asia came to render homage to Fu Chien, sovereign of the earlier Ch'in." Most of the kingdoms no doubt had provinces, districts, tribes, clans, towns and villages which sometimes had more than one native name as well as foreign names, so that it seems a reasonable conjecture that in 381 A. D. there were in Northeast and Central Asia thousands of geographical and ethnic names of which probably less than one per cent have come down to our times.

In view of the immense gaps in our knowledge, the establishment of a firm basis for any historical identification proposed would seem to be an obvious requirement. Yet some historical problems, such as the Tokharian problem, are so vast and complicated, involving a knowledge of geography and history over an extensive region for a considerable period, and textual criticism ranging in the above instance from Ancient Greek to Modern Japanese, that a mere linguist is left aghast. So one can hardly expect the historian to carry the added burden of linguistic analysis unless he is provided with a simple procedure and the tools with which to work.

The present paper is an essay toward establishment of a methodology of analysis of linguistic problems in history, together with an illustrative critique of one such problem, that recently raised by Otto Maenchen-Helfen [1a] in his equation "Yüeh-chih = Kusha." The selection was purely accidental and examples from other authors will be utilized in this and subsequent papers.

In any historical identification, three main questions arise: What was the local pronunciation at the time? How did it sound to the foreign transcriber? Did he transcribe solely, or did he modify the transcription to accord with the semantic patterns or morphology of his own language?

Our only answers lie in the historical records. For the local pronunciation, we must rely largely on the written language of the time, and as the script of language never exactly represents all the phonemes, we may often draw certain inferences from foreign transcriptions. Different foreigners "hear" the same language differently. Chinese unaspirated surd stops sound like sonants to the average American, while they are recognized as unaspirated surds by persons whose native language possesses such phonemes. Consequently transcriptions of the same language will differ.

So for historical identifications to rest on any sound linguistic basis, the historian will require transcription equations and a semantic analysis of historical names for the languages with which he is concerned, in order to provide him with criteria by which he may judge the validity of his interpretations.

For mechanical reasons, this paper will present only the essay in methodology, while following papers will provide transcription equations, with the evidence therefor and short critical examples, for Brāhmī (Saka dialect?), Tibetan, and Uigur transcriptions of Chinese; Uigur and Chinese transcriptions of Sanskrit; and Chinese transcriptions of Uigur. These will be followed by examples of semantic analyses.

PHONETICS

Materials. In laying the foundation for an identification one must consider what were the terms used, by whom, when, and sometimes where and

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[1] Paul Pelliot, "Tokharien et Koutchéen," JA 224 (1934) 40 n.

[1a] "The Yüeh-chih Problem Re-examined," JAOS 65 (1945) 71-81.

how. How a term is employed is a question of textual criticism and not for linguistics. It has usually been competently handled by the historian and will not be discussed here. "Where" enters into the present discussion, for example, in Kumārajīva's transliteration of *Kuṣaṇa*. Kumārajīva was born in Kucha and brought up in India. One may assume that he would be competent in his transliterations.

The history of the word **Kuṣa-* begins with the copper coins issued with a bust of Hermaios, last Greek king of Kābul, on the obverse with the legend BAϹIΛEΩϹ ϹTHPϽϹ ϹV EPMAIϽV and on the reverse Herakles, facing, holding a club in his right hand and a lion's skin over his left arm, with the Kharoṣṭhi legend *Kujula kasasa kuṣaṇa yavugasa dhramaṭhidasa*,[2] indicating, it is believed, his joint rule with Kadphises I (Kujula Kadphises) from about 45-50 A. D.[3]

On a coppper coin of Kadphises I, king of Bactria and Kābul about 45 or 50-85 A. D.,[4] 1) obverse, a corrupt Greek legend intended for KOPϹANO or KOPANO KOZOUΛO KAΔΦIZOY, according to □P□Λ□ KAΔΦIZ□Y; reverse, Kh. *-gasa dhramaṭhi-*.[5] According to Percy Gardner, 2) obverse, KOPCNΛ-KOZOVΛO-KAΔΦIZOV, reverse, Kh. *Kujula-kasasa kuṣaṇa-yavugasa dhramaṭhidasa*;[6] I can read only KOPC... [K]AΔΦIZ□Y with any certainty. 3) obverse, K□P□NΛ-K□Z□VΛ□.[7] 4) reverse, Kh. *-sa dhramaṭhidasa Kuṣaṇa*.[8] 5) reverse, Kh. *sa Kujula*.[9]

Smith listed under Kadphises I coins which Gardner and R. B. Whitehead[10] included under Kadaphes, who Gardner thought was probably a successor of Kadphises I. There is considerable justification for the separation. Numismatically, one may note that while both series of coins were of copper, those with Kadphises' name are in size about .9, those of Kadaphes about .7. The coins of Kadphises have on the obverse a bust of Hermaios, on the reverse Herakles facing with his right hand on a club and a lion's skin over the left arm; those of Kadaphes have on the obverse a head resembling that of Augustus and on the reverse a figure, probably the king, on a seat resembling a curule chair, with his right hand extended.

Linguistically, the two series of coins differ greatly. On the coins of Kadphises, the Greek legends were corrupt, those of Kadaphes are clear. In those of Kadphises, the *o* of the Greek legend was square, the Φ a Φ, and the U a V, in the coins of Kadaphes they appear as O, *ϕ*, and Y respectively.[11]

The inscriptions are quite different. Compare with those of Kadphises given above, the legends of Kadaphes: obverse, XOPANCY ZAOOY KOZOΛA KAΔAΦEC, reverse, *Khuṣaṇasa yauasa kuyula kaphsasa sachadhramaṭhidasa*.[12] We note considerable phonetic change. In place of the * KOPCANO of Kadphises, we have XOPANCY of Kadaphes, with K > X (*k*ˣ or *x*?), final -O > -Y, and metathesis of -C-.[13] In place of the KOZOVΛO of Kadphises, we find KOZOΛA, perhaps indicating the second vowel had become shortened. In place of KAΔΦIZOV, we have KAΔAΦEC. Whether this last represents phonetic change or a change of monarchs must be left to the historians to decide.

In the Kh. legend, in place of *Kuṣaṇa*, is *Khuṣaṇa-*, bearing out the aspirated or fricative initial of the Greek legend. Instead of *yavugasa, yauasa*. Where the first had *Kujula*, the second had *Kuyula*.

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[2] Vincent A. Smith, *Catalogue of the Coins in the Indian Museum, Calcutta*, 1 (Oxford, 1906) 33-4; Percy Gardner, *The Coins of the Greek and Scythic Kings of Bactria and India in the British Museum* (London, 1886) 120-1.

[3] Smith, op. cit., 33. Sten Konow, in his latest dating, apparently accepted Rapson's estimate of Hermaios' reign as c. 40 B. C. (Journ. of Indian Hist. 12 (1933) 24, 29).

[4] According to Smith, 65. His conquest could not have taken place before 25 A. D., according to Sten Konow, *Kharoshthi Inscriptions*, Corpus Inscriptionum Indicarum, v. 2, pt. 1, p. lxii.

[5] Smith 65.

[6] Gardner, 122. Gardner stated (p. lxx, n.) that on the coins he could not distinguish between the Kh. characters for *na* and *ṇa*. As the character employed seems always to be the same in the word under discussion here, I have arbitrarily normalized its transcription to *ṇa*.

[7] Gardner 122, No. 3. I can read only .□PC . . . □ZYΛ□, or perhaps X instead of K.

[8] Smith 66, No. 2.

[9] Smith 66, No. 4.

[10] *Catalogue of Coins in the Panjab Museum, Lahore*, v. 1, Indo-Greek Coins (Oxford, 1914) 811, Pl. XVII, no. 24.

[11] According to Gardner, more precise in epigraphy. For a discussion of round and square forms, see Ludwig Bachhofer, "On Greeks and Śakas in India," JAOS 61 (1941) 232-4.

[12] Gardner 123, Pl. XXV, 5; Cunningham, N. Ch., ser. 3, v. 12 (1892) Pl. IV (fol. p. 82) no. 7; Smith, 66, 67. On a coin in the White King collection, *kadaphasa* (Whitehead 152). Smith and Whitehead read *-tasa* instead of *-dasa*.

[13] Indicating Sogdian influence?

There are too many indications of linguistic divergence to blame them all on errors of the coiners.

Linguistically in an intermediate position seems to be a copper coin of a different type, in size approximately that of Kadaphes with rounded O and C in the Greek legend. The obverse has the head of the king right, wearing a helmet with two curved horns, and reverse an armed Macedonian soldier, wearing a helmet and standing with spear and shield. Of the Greek legend, only KOPCANO can be read,[14] and the Kh. legend is *Kuyula-kaüsa Kuṣaṇasa*, according to Smith.[15] In the Greek epigraphy, and in the *y* of Kh. Kuyula, this coin agrees with those of Kadaphes, otherwise linguistically with those of Kadphises.

A coin by Heraos or Miaos,[16] a "Kushan king of West Afghanistan, earlier than Hyrkodes," whom Rapson placed between 50 and 1 B. C., but placed doubtfully by Smith in the first or second century A. D.,[17] has a legend on the reverse which Smith read as [K]OPCANO.[18] A. Cunningham reproduced the same coin, where part of the legend is much clearer.[19] E. J. Rapson [20] read KO ‖ ANOY, which is clear. Cunningham's, Smith's, and Rapson's plates show two vertical lines and if one of them represents P the other cannot represent Σ.[21]

Besides these tetradrachms, Cunningham shows a number of oboli on which he thought to read KOPCANOY or at least some part of this legend. The clearest of these is no. 7, which reads .ORANO, with the R indented in the middle right but not meeting the vertical line at the left. The "R" is rather crushed together as by lateral pressure, so that it looks somewhat like ‖ except that the tops of the lines are joined and the right line is indented. As ‖ occurs quite clearly on at least two examples of the same tetradrachm, it can not be a worn "R" of the type mentioned above. But the latter may be a development of ‖ or vice versa.

I think Cunningham's interpretation of this "R" as PC is because he considered the ρ to be a P with the line not meeting at the middle while the σ was inscribed as C crowded under the loop of P, something like Pc, if they were crushed together and the c were more open. As the O is not square, as in the tetradrachms, but rounded, it is reasonable to suppose that the σ is not Σ, as in the tetradrachm, but C. Thus there is some justification for Cunningham's reading of *rs*. However, I have not found other examples of this type, and it is questionable whether both the crushed "R" and ‖ are not transition symbols for Þ.

On other coins, there is no question of *rs*. Only Þ occurs. KOÞANO is found on the coins of Kaniṣka, king of Gandhara and Northern India,[22] cir. 120-150, according to Smith, or 125-152 A. D. according to Konow;[23] of his successor, Huviṣka, cir. 150-180;[24] of Vāsudeva, king of Northern India, cir. 185-220;[25] of Kaniṣko (Kaniṣka II?) and of Vāsudeva (II?), kings of Northwestern India in the third century.[26] On coins attributed to Kuṣano-Sassanian kings of the fourth and fifth centuries, one finds KOÞANO and KOÞONO, nearly always the latter.[27]

In Indian inscriptions, *kuṣāṇa* occurs in a Brāhmī inscription from Māṭ, near Mathura;[28] *khuṣaṇasa* on the Taxila silver scroll[29] of 79 A. D.;[30] *guṣaṇasa* on a Panjtār inscription[31] of 65 A. D.;[32] and *guṣaṇa-* on the Māṇikiāla stone inscription[33] of 145 A. D. according to Konow, of 41 B. C. according to Mukherji.[34]

In inscriptions from Niya, occur *kurṣanaṣa*,[35]

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[14] I can read only . . KOPC . . .

[15] 66, no. 5.

[16] There is considerable doubt as to the spelling.

[17] Smith 94, 93.

[18] Smith 94. I can read nothing.

[19] N. Ch., ser. 3, v. 8 (1888) Pl. III (fol. p. 48), nos. 1 and 2.

[20] *Indian Coins* (Strassburg, 1897) 9 and Pl. II, no. 1 with note opposite.

[21] For another coin of this king, see Gardner 116, and his interpretation of the legend, p. xlvii.

[22] Smith 69.

[23] Smith 69; Konow, Kh. I., lxxvi-lxxviii of op. cit. in n. 4 above.

[24] Smith 75, 77, 82.

[25] Smith 84.

[26] Smith 87, 88.

[27] Smith 91-2, nos. 1, 4, 5, 3; Ernst Herzfeld, *Kushano-Sassanian Coins*, Memoires of the Archeological Survey of India, No. 38 (Calcutta, 1930) 40 a.

[28] Konow, op. cit., xlix.

[29] Op. cit., no. XXVII, l. 3.

[30] "Notes on Indo-Scythian Chronology," Journal of Indian History 12 (1933) 32.

[31] Konow, Kh. I., no. XXVI, l. 1.

[32] Konow, Indo-Scythian Chr., 31.

[33] Konow, Kh. I., no. LXXVI, l. 2.

[34] Konow, Kh. I., xciv, in connection with his statement that he saw no reason for changing his dating of the Kaniṣka era (op. cit. in n. 30 above, p. 44). Dhirendra Nath Mukherji, "The Era Used by the Kuṣana Kings," Indian Culture, 1, p. 477.

[35] A. M. Boyer, E. J. Rapson, and E. Senart, *Kharoṣṭhi Inscriptions Discovered by Sir Aurel Stein in Chinese Turkestan* (Oxford, 1920-9), 117, col. B, l. 6.

kuṣanaṣena,[36] and *kuṣanasena*,[37] all probably of about the third century of our era.[38]

Of Chinese transcriptions of *Kuṣaṇa*, we have 拘沙 *ᵓkịu-ṣa*, according to the Ancient Chinese transcriptions of Karlgren,[39] in chapter 6 of a Chinese translation of the Sūtrālaṅkāra of Aśvaghoṣa by Kumārajīva in the dynasty of the later Ch'ins, about 405 A. D.;[40] 瞿沙 *kịu'-ṣa*[41] in Buddhavarman's Chinese translation of the Abhidharma Mahāvibhāṣā between 425 and 439;[42] and finally 屈厦拏 *kịuət-ɣa-nja*[43] by Hsüan-tsang in the corresponding passage of his translation of the above.[44]

Then we may note the Tibetan version of the Mahārājakanikalekha where the *kuśa* race of the king refers to Kaniṣka, according to Maenchen-Helfen, citing an early article of F. W. Thomas, published in 1903. This is a disputable point, as the text reads Kanika, and Taranatha explicitly stated that they were not one and the same person and narrated some details of the life of King Kanika.[45]

Tibetan *guzan* cannot be considered a Tibetan transcription of *kuṣaṇa* or *guṣaṇa* as proposed by Thomas[46] and accepted by later writers. If one Tibetan work transcribed *kuṣaṇa* as *kuśa*, why should the Li-yul-gyi-lo-rgyus or Annals of Khotan transcribe it as *guzan* when the Khotanī inscriptions show only *k-*, never *g-*? There is also the question of *z* in place of *ś*. The objective of avoiding textual criticism in this paper has been violated here because recent authors seem unaware that Prof. Thomas no longer holds to his early theory, but translated simply "King Kanika" and thought "Gu-zan would be Guchen."[47] One may agree with Thomas in eliminating *gu-zan* from further consideration in connection with the Kuṣaṇas.

We also have the Uigur transcription *kuisan*, which is interpreted as *küsän*, occurring in three colophons.[47a]

The linguistic data collected on the Yüeh-chih: 禺知 *ngịu'-ᵓtịe* or 禺智 *ngịu'-ᵓtịe'*[48] in the Mu-t'ien-tzŭ-chuan, written before 299 B. C., perhaps about the middle of the fourth century B. C.;[49] 牛氏 *ᵓngịu-ᵓtśịe*[50] occurring once in the Kuan-tzŭ, attributed to Kuan Chung, who died 645 B. C., but probably less than ten per cent of the work may belong to the beginning of the fourth century B. C., the balance post-Han (i. e. after 220 A. D.);[51] 禺氏 *ngịu'-ᵓtśịe*[52] in the commentary of Ho Ch'iu-t'ao 何秋濤 to ch. 59 of the I-Chou-shu, a chapter which presents many controversial problems as to dating, according to Prof. Peter A. Boodberg;[53] and 愚氏 *ᵓngịu-ᵓtśịe*[54] cited by Liu-kêng 劉賡 from the Chi Jui 稽瑞 of T'ang times.[55]

Other transcriptions are 月支 *ngịʷɐt-ᵓtśịe*[56] in the Hai-ching, second part of the Shan-hai Ching, originating perhaps in the beginning of the Han dynasty (began 206 B. C.), according to Herrmann; in a section which seems to date from the Han, according to Pelliot; but Prof. Boodberg believes that while chapters 1-13 of the Shan-hai-ching date from the first Cent. A. D., the materials date to 4-3 Cent. B. C., ch. 14-18 being added about the 4th Cent. A. D.;[57] on two wooden tablets found in the region of Niya of about 269 A. D.;[58] and in the Chu Fa-hu of 280 A. D.[59]

Albert Herrmann thought the oldest source for

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[36] Op. cit., 5, 136, 193, 320, 399, 478.
[37] Ibid., 198.
[38] Ibid., 325 and n. 1.
[39] Bernhard Karlgren, *Analytic Dictionary of Chinese and Sino-Japanese*, Paris, 1923, nos. 484, 846. Referred to hereafter as K.
[40] Sylvain Lévi, "Notes sur les indo-scythes," JA, 9 sér., v. 8 (1896) 445, 457.
[41] K 490, 846.
[42] Sylvain Lévi, "Devaputra," JA 224 (1934) 11 n.
[43] K 493; Karlgren, "Grammata Serica" (denoted hereafter as KG), Bull. of Mus. of Far Eastern Antiquities 12 (1940), no. 36 d; KG 94 b'.
[44] Lévi, op. cit.
[45] Thomas, "Matriceta and the Maharajakanikalekha," Ind. Ant. 32 (1903) 348, 356 par. 49.
[46] Ibid., 349.
[47] *Tibetan Literary Texts and Documents concerning Chinese Turkestan*, Pt. I (London, 1935) 119 n. 2. For a full account, see JRAS (1931) 822-7.
[47a] F. W. K. Müller, "Toxrï und Kuisan (Küsän)," SBAW (1918) 566-586.
[48] K 1325, 1218.
[49] G. Haloun, "Zur Üe-tṣi-Frage," ZDMG 91 (1937) 300, 302; Maenchen-Helfen 77.
[50] K 673, 879.
[51] Personal communication from Prof. Peter A. Boodberg; Haloun 298; MH 77.
[52] K 1325, 879.
[53] Personal communication; Haloun, op. cit. (n. 49 above), p. 298.
[54] K 1325, 879.
[55] Haloun, op. cit. (n. 49 above), p. 298.
[56] K 1347, 1212.
[57] Paul Pelliot, "Tokharien et Koutchéen," JA 224 (1934) 40 n.; Boodberg, personal communication; Herrmann 175.
[58] Pelliot, op. cit.
[59] Lévi, BEFEO 5 (1905) 289.

月氏 *ngi̯ʷɒt-tśie*[60] was in the 110th book of Ssŭma Ch'ien, cir. 160 B. C.;[61] Haloun believed in a petition to the throne of the Chia I of perhaps 172-69 B. C.[62] It also occurs in the travels of Fa-hsien, cir. 400 A. D., and the Chin-shu mentions the 大月氏 "Ta-Yüeh-chih."[63] The Chin-shu was composed in the forties of the 7th C. from documents of 280-420.[64]

This completes the data it has been possible to collect on the two terms Maenchen-Helfen compared.

Conflicting Evidence. Before proceeding to compare "Kuṣaṇa" and "Yüeh-chih," it would be well to clarify some of the conflicting evidence for each if possible.

Regarding "Kuṣaṇa," J. F. Fleet[65] and J. Kirste[66] showed that the Greek omicron often recorded an Indian or Iranian short *u*, which accounts for its use in Greek legends on coins to transcribe the *u* of *Kuṣaṇa*, while the Kharoṣṭhi legend had *u*.

The evidence pointing to **Kurṣaṇa* as an earlier form is very weak. Despite the worn and perhaps corrupt Greek legends on early Kuṣaṇa coins which are difficult of interpretation, a reading *-rs-* seems probable. I am inclined to believe that the Greeks actually pronounced both phonemes, for otherwise how could we have metathesis such as we find in the XOPANCY on the coins of Kadaphes? Of course we can always malign the die cutters who have no redress, but the other phonetic changes on the coins of Kadaphes indicate we should be making a false accusation.

Yet the fact that on all the Kuṣaṇa coins, including the early ones where *-rs-* occurs in the Greek legends, the Kharoṣṭhi legends invariably have *-ṣ-*, make it probable that the Greek pronunciation *-rs-* was merely an approximation to the phoneme. We have only one possible example of *-rs-* in the term under discussion in a Kharoṣṭhi inscription and that was at Niya, from which none of the coins are known to come. A non-Iranian scholar may be allowed to wonder whether a reinterpretation of the Kharoṣṭhi inscription where *kurṣana-* occurs would not lead to different results.

The fluctuation of the guttural initial seems at present to be an insoluble problem. Initial *k-* occurs on all the coin legends except those of Kadaphes, on all the inscriptions from Niya and in the Brāhmī inscription from Māṭ; initial *kh-* on the coins of Kadaphes and the Taxila silver scroll; *g-* only at Panjtār and Māṇikiāla. If one found *g-* in two adjacent towns we might be inclined to attribute it to a local dialect. But Pantjār lies to the northwest, Māṇikiāla to the southeast of Taxila, which lies about midway between. One may consider this an instance of lateral areas preserving older linguistic features than central areas,[67] but until we have a more thorough study of Kharoṣṭhi dialects and the chronological development of sound shifts,[68] such speculation seems idle.

The dating of Kuṣaṇa coins and inscriptions is too uncertain to classify one initial as more archaic than another, and archaic phonemes sometimes survive a long time in isolated localities, so that even the precise dating of the monuments will provide no certain solution to the problem.

Konow's suggestion,[69] that the variants *g-*, *kh-*, *k-* show that the initial could not have been a familiar sound but that it probably was a guttural fricative, is unsatisfactory. For no one guttural fricative would account for a change of sonancy. If the initial had been *x-*, it would no doubt have been transcribed *kh-*; and if *γ-*, as *gh-*. But neither fricative would be transcribed as *k-*, *kh-*, and *g-*.

The most serious problem in connection with the Chinese recordings for "Yüeh-chih" is the final *-t* in what is probably the most common transcription, but the lack of it in the others. It may be an instance where the first Chinese character "anticipates" the initial of the following syllable —in this case the *t* of the affricate initial of *-tśie*.

[60] K 1347, 879.

[61] Herrmann, "Die Westländer in der chinesischen Kartographie," in Sven Hedin's *Southern Tibet*, v. 8 (Stockholm, 1922) 175 n., 452.

[62] Haloun 248 and n. 4.

[63] Pelliot, op. cit., 40 n.

[64] Personal communication from Prof. Boodberg.

[65] JRAS (1907) 1046.

[66] SWAW, ph-h. Kl., 182, 2, p. 17.

[67] See G. Bonfante and Thomas A. Sebeok, "Linguistics and the Age and Area Hypothesis," American Anthropologist 45 (1944) 383, with bibliography; and criticism by William M. Austin, "The Scientific Method and Historical Linguistics," JAOS (1945) 63-4.

[68] Konow, Kh. I., lii, and elsewhere has given some hints of such developments. T. Burrows compared two of Asoka's edicts, Kharoṣṭhi of NW India, Ms. Dutreuil du Rhins, and documents from Niya in "The Dialectical Position of the Niya Prakrit," BSOS 8 (1936) 419-435.

[69] Kh. I., 68.

Haloun believed[70] that most, at least, of the Chinese transcriptions without *-t* were East Chinese, arising through trade with the Nephrites while 月氏 first occurred in Han times as an official writing, but likely as an inheritance of a West Chinese dialect writing. It is true that the Mandarin, including the Western dialects in Kansu and Szechuan, dropped final stop consonants so that now 月 is spoken üo, üə, in those provinces,[71] and may have passed through a stage *ngi̯uo*, or something like that. But I have seen no evidence of *-t* dropping anywhere in China during Han times. I do not know what the Nephrites had to do with the transcription, and it may be I have missed Haloun's point.

There are other points in the Chinese transcriptions which need elucidation: the variant vowels of the first character; the variant initials, *t* and *tś*, of the second. In fact there are so many problems which need explanation in both "Kuṣaṇa" and "Yüeh-chih" that it is doubtful just what is being compared. Is it *kuṣaṇa* with *ngi̯ʷɒt-tśie̯*, or *guṣaṇa* with *ngi̯u-tie̯*? If historians collect the evidence as has been done here and examine the conflicts in what is supposedly the same word, many will probably not wish to go further until doubtful points are cleared up so that they will have a firm basis for a comparison. Some historians are, however, artists. The more conflicting evidence there is the better they like it. They select what pleases them and disregard the rest. The resultant picture they call "Truth." Maenchen-Helfen's equation is of this type.

It was A. von Staël-Holstein[72] who first proposed the identification. He thought we must suppose that 月氏 was pronounced *gur-ṣi* or *kur-ṣi* in some old Chinese dialect and transcribed a N. sg. *kuṣi*, *kurṣi*, noting that Chinese *-t* was transcribed *-r* in Old Bodish (Tibetan) and Uigur and that *gu-* occurred in the Kharoṣṭhī inscriptions of Māṇikiāla and Panjtār.

In reviving this theory, Maenchen-Helfen presented the Chinese transcriptions collected by Haloun, gave the phonetic transcription of the characters in Ancient and Archaic Chinese according to Karlgren, and stated that *ngi̯wɒt-tśie̯* < **ngi̯wăt-tia*, *ngi̯u-tśie̯* < **ngi̯u-tia*, *ngi̯ə̯u-tśie̯* < **ngi̯ŭg-tia*, *ngi̯u-tie̯* < **ngi̯u-tiĕg* "make **gut-tia* as good as certain" and concluded that it must transcribe Kusha.

In taking Karlgren's Archaic Chinese transcriptions to obtain the final *-a* to compare with the *-a* of Kusha, MH obtained a *-t-* which was one step further removed from the *sh* of Kusha than the *tś* he had to start with, and had two surplus *-g*'s which he did not have originally. He disregarded them. He still had an *-ĕ-* in one transcription which he also passed over in silence. It seems unnecessary here to enter into further details of MH's cursory explanation. We shall proceed with the methodology.

Transcription Equations. After assembling the linguistic data chronologically and solving such internal conflicts as can be solved, the question is whether the word equation accords with the transcription equations. A linguist would not think of suggesting a Gothic and a Sanskrit word were genetically related if the comparison obviously violated the phonetic equations established for Indo-European. There is no more reason for the historian to make identifications of historical proper names if they are obviously contrary to the transcription equations, except that heretofore these have never been determined. It is proposed in succeeding papers to present the data and the resultant equations for some of the most important languages of Asia. It will not be an absolute guide for the historian for we shall never have all the equations for all the phonemes for all the languages at all the different periods with which the historian is concerned. But such equations should furnish the historian with transcription rules which he will hesitate to transgress without good reasons.

The general opinion of scholars seems to be that the Kuṣaṇas were Sakas,[73] and I assume that "Yüeh-chih" represents a Chinese transcription of Kuṣaṇa rather than the reverse, although MH did not make clear his views on this matter. Under this assumption, we should have Chinese transcriptions of Saka words and the transcription equations evolved from such data. The only Saka language on which we have considerable information is Khotanī but so far I have been able to find

[70] P. 307.

[71] See Karlgren, *Études sur la phonologie chinoise*, Archives d'Études Orientales, v. 15 (Leiden and Stockholm, 1915), 871, no. 80.

[72] "Koḍano and Yüeh-shih," SBAW (1914) 645-7.

[73] Thus Konow, Kh. I., li; and more recently Ludwig Bachhofer accepted this conclusion, JAOS 61 (1941) 250.

only one Chinese transcription of Saka.[74] In fact, in looking over Konow's Saka Studies, the writer has been able to find no Khotanī geographical terms, which he felt sure were Saka, for the Chinese to transcribe, as will appear in a later paper.

The most closely related system of transcription found is a Brāhmī transcription of Chinese, published by F. W. Thomas.[75] Thomas stated that this was Saka. I do not believe this was quite the case. The transcription has certain phonetic features peculiar to Khotanī, but some others which diverge from it. It may have been a dialect of Saka. At any rate it is one of the known Central Asian languages which records a Chinese nasal initial as the corresponding sonant stop, and so gives as favorable a chance for the survival of MH's equation as can be found.

By this Brāhmī (Saka dial.?) system of transcription of Chinese, Ch. *ngi̯u-ti̯e* would be **gu-khī*; *ngi̯äu-ti̯e*, **gau-cī*; *ngi̯u-ti̯e*, **gū-cī*; and *ngi̯ʷɒt-ti̯e*, **gvir-cī*. These are probabilities. Exceptions indicate the possibility of *gy-* instead of *g-* given above. The **gau-cī* and **gū-cī* look like possibilities in favor of von Staël-Holstein's **kuṣi* rather than of MH's **kuṣa*, but leave the *g* instead of *k*, and the *c* instead of *ṣ* to be accounted for.

Von Staël-Holstein noted the initial *g-* in *guṣaṇa-* at Panjtār and Māṇikiāla. But these sites are in Northwestern India, a thousand miles beyond Niya where we might expect the Chinese to first come in contact with the word, and at Niya only *kuṣana-* (*kurṣana-*) is found. But the Chinese did not make their transcription from any word heard at Niya, Panjtār or Māṇikiāla, but probably when the Yüeh-chih lived between Tun-huang and K'i-lien and their country comprised Liang-chou, Kan-chou, Su-chou, Kua-chou, and Sha-chou,[76] perhaps a century or two before the Kuṣaṇas appear on the historical scene. This chronological factor alone casts doubt on the whole theory, though one may contend that *kuṣaṇa* existed in the spoken language of the Sakas for some time before it was recorded in their language.[77]

A remaining phonetic problem seems insurmountable for MH's theory — the Chinese representation of the *-ṣ-* of *kuṣaṇa* by *t-* or generally by *tś-*. The Brāhmī transcription of Chinese renders Ch. *ṣ-* by *ṣ-* or *ś-*, Ch. *ś-* by *s-*, and Ch. *tś-* by *c-*. One example of the Chinese transcription of *ṣ* by *tś* might be put down to poor recording, but when the Chinese transcriptions consistently avoid *ṣ* in favor of *tś* (*t*) it is decisive proof against the theory and not against the Chinese.[78] There is only one possible loophole for MH's equation, the assumption that the traditional gloss which states that 氏 should be read 支 in Yüeh-chih, i. e. with *tś* initial and not *ź* as in its use for "clan, family," is wrong. The Brāhmī transcription published by Thomas regularly has *ś* corresponding to Ch. *ź*, so that by the above assumption *ngi̯u-ti̯e* would give **gūśī*.

It was noted above in the section on Conflicting Evidence that it was very doubtful if "Kuṣaṇa" was ever *kurṣaṇa*. And if it were, it is still improbable that the *-t* of Chinese *ngi̯ʷɒt* could have been a transcription of the *-r-* of KOPCANO of the coin legends ort he *kurṣana-* of one Niya inscription. For while Ch. *-t* had become *-r* in certain northern dialects in T'ang times, as Sino-Korean *nguer* for 月 about 600 A. D. and Buddhists transcribed *karma* as 羯磨 *ki̯ät-mua*, Karlgren pointed out to Konow that the final consonant of 月 was "decidedly a *-t* in pre-Christian time, not an *-r*, and has noted that in Han times, foreign *-r* appears to have been transcribed by *-n*, as 安息 *·ân-si̯ək* = Arsak.[79]

Morphology

Because of the use of Greek omicron to transcribe Indic and Iranic *u*, Konow thought the Greek coin legends should be read *kuṣanu*, a G. pl.

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[74] 塞 *sək* (773) "Saka" — Haloun, ZDMG 91, 251.

[75] "A Buddhist Chinese Text in Brāhmī Script," ZDMG 91 (1937) 1-48.

[76] Konow, Kh. I., liii and n. 4.

[77] Roswell S. Britton, *Fifty Shang Inscriptions*, Princeton, 1940, suggested "as a working hypothesis" that the 𠂤 tribe mentioned on the Shang divination inscriptions from Anyang belonged to a migrant stock such as the Yüeh-chih (p. 13). It will be noted that Britton carefully avoids even suggesting that they were the Yüeh-chih. In fact on p. 8, he gives the glyph 𠂤 → 月, the latter one of the characters generally employed by the Chinese in transcribing Yüeh-chih. If any evidence is forthcoming of the existence of the Yüeh-chih prior to the fourth or third century B. C., it will probably be from such records.

[78] MH's statement (77, n. 89) that "The Turkish forms of Kucha have *tš*, *dž*, *š* and *s* (*s* < *ts*, or < *ś* < *ts*," citing Bailey, has nothing to do with the question unless he is implying that *kuṣaṇa* is of Turkish origin, which he does not seem to be doing.

[79] Kh. I., lix; Karlgren, "Problems in Archaic Chinese," JRAS (1928) 790.

of a N.-G. sg. *kuṣi*.[80] The vowels of the latter and the **gūšī* cited at the end of the second paragraph above would then correspond exactly.

But in a later article,[81] he wrote of a shorter form *kuṣa* known from the coin legends of Kaniṣka and his successors, but cited no references. This would have been worth full elucidation as it concerns not only historical identification but Konow's own theories that Kuṣāṇa,[82] as the designation of a principality (cf. Irān, Wakhān), was a genitive plural and an adjective (cf. Saka *balysāna* formed from *balysa*, "the Lord"). If such forms exist on the coins, and are not merely due to inability to read the complete legend or to abbreviation, it would be well if we knew whether *kuṣa* represented the nominative or some other case. Konow cited the Chinese transliteration *kiu̯-ṣa* as support for a form *kuṣa*. This evidence is not conclusive unless most scholars who have dealt with Chinese transliterations are wrong in assuming that the Chinese frequently dropped a syllable from their transliterations.

None of these inscriptions have anything shorter than *kuṣan-* and unless we have specific evidence of a form *kuṣa* actually existing in the Saka language, this is one more point against the equation of MH, as none of the Chinese transliterations of "Yüeh-chih" indicate a final *-n*. And if *kuṣa*, not *kuṣi*, is correct for a N. sg., then the final *-a* of *kuṣa* does not correspond with the final vowels for the transcription of Yüeh-chih.

Resumé. Maenchen-Helfen's equation "Yüeh-chih = *Kusha" is really an identification of two sets of variables and most of the variants have not been clarified. Otherwise the acceptance of MH's equations would require the following assumptions: that *g* was the earliest form of the initial of *kuṣaṇa*, although what appears to be the oldest records of the word — on the coins — runs counter to this supposition; that the Chinese traditional gloss stating that the initial of the second character was *ɬś*, was incorrect; that the N.-G. sg. of *kuṣaṇa* was *kuṣi*, a form which has not been found. These assumptions would permit identification of Ch. *ngi̯u-ɬśi̯e*, the least well attested of the Chinese transcriptions of "Yüeh-chih," with *kuṣaṇa*. It would not account for all the other Chinese transcriptions.

We omit a detailed phonetic examination of all the towns which MH thought were named after the Kuṣaṇas: Kush (Alexandria, Balkh); a town in Sogdiana, known to the Chinese as 屈霜你迦 *kiu̯ət ʂi̯ang 'ni ʿka*,[83] 貴霜匿 *kj^{w}ə̯i̯' ʂi̯ang ni̯ək*,[84] mp. *kušanīk*, np. *kušānī*, the present Kashan-Ata; Kish in Sogdiana, modern Shah-risabz; Kuchān, in the region of Lan-chou; Kucha; K. san, Kao-ch'ang, and Ku-shih, nearly all of which have a confused jumble of spellings or transcriptions which require clarification. The most powerful heads of state seldom have more than one city named after them. We have only one Petrograd, a Stalingrad and a Stalinabad. But if MH were correct, our highest pressure publicity men would hang their heads if they ever heard of the Kuṣaṇas, for "there were towns 'of the Kushānas' not only in regions which formed part of their great empire, but also far beyond it."

The name of only one of these towns will be examined in detail here, not because MH thought it was named after the Kuṣaṇas, but because Konow considered it in connection with Yüeh-chih, and because it illustrates how the collection and examination of the linguistic material sometimes makes unnecessary a detailed examination of transcription equations.

Kuci = "Yüeh-chih"?

Konow[85] thought that *Kuci*, the form found by Lüders in a native Brāhmī document as the designation of the inhabitants of Kucha, could be a later form of the name Yüeh-chih, and that *kucā* would be the feminine form for the city. Pelliot[86] believed *Kucā* was sanskritized to *Kuci*.

The data collected on Kucha: Chinese transcriptions: 龜茲 *ʿkj^{w}i-ʿtsi*[87] in the Ch'ien Han-shu, Annals of the earlier Han dynasty, covering the period 206 B. C.–A. D. 24, and written by Pan-ku, who died A. D. 92;[88] 歸茲 *ʿkj^{w}ə̯i-ʿtsi*[89] in a

[80] Kh. I., lii-liii.

[81] Op. cit. (n. 30 above), p. 27.

[82] The only possible instance of *ā* in this word is in the Māṭ inscription, and the single word is cited by Konow.

[83] K 493, 923, 14, 342.

[84] K 456, 923, 661.

[85] "War 'Tocharisch' die Sprache der Tocharer?," AM 9 (1933) 459.

[86] "À propos du 'tokharien,'" TP 32 (1936) 283. For the fallacy of Pelliot's theory, and probably of Konow's, see fifth paragraph below.

[87] K 462, 1094.

[88] Sylvain Lévi, "Le 'Tokharien B,' langue de Koutcha," JA (1913) 323; Konow, "Notes on Indo-Scythian Chronology," Journ. of Ind. Hist. 12 (1933) 9.

[89] K 1241, 1094.

version of the Candraprabhakumārasūtra, the Shen jê ching, of the third century A. D.;[90] 丘慈 *ʻk'i̯ə̯u-ʻdz'i*[91] in a translation of the Tathāgataguhyasūtra dated 288 A. D.;[90] 屈茨 *k'i̯uət-ʻdz'i*[92] in the Shih-shih Hsi-yü-chi, written before A. D. 527;[93] 屈支 *k'i̯uət-tśi̯e*[94] in the Mémoires of Hsüan-tsang of A. D. 630.[95]

Indic: Kharoṣṭhi of Niya *kuci raja* "kingdom of Kuci,"[96] probably about the third century; Skr. *kuci-mahārāja* in a document whose archaic type of northern Turkestan Brāhmī shows it was written not later than the beginning of the sixth century;[97] and this and *kuci-viṣaya* "kingdom of Kuci," *kuci-śvarasya* and *kauceyanarendra* "king of Kuci" in documents of the later type of writing of about the first half of the seventh century;[98] Skr. *kucīna* in translation of Ch. 丘慈 in a Sanskrit-Chinese dictionary, the Fan yu tsa ming, taken to Japan in 850 A. D.[90]

Turkish: *küsän* (*kwys'n* in Sogdian script, *kws'n* in Arabic script).[99]

Mongolian: *küsän*, in the Secret History of the Mongols, of the first half of the 13th century.[100]

The modern form *Kučā* apppeared about 1330 in the 苦叉 *K'u-ch'a* of the Ch'ing shih ta tien,[100] and was used in the beginning of the 17th century as Bento de Goes wrote *Cucia*.[101]

While deductions as to phonetic shifts occurring during the history of this word must necessarily remain tentative unless corroborative evidence is found, particularly of Chinese transcriptions of Kuchean words at various periods,[102] yet Lévi's careful dating does seem to furnish indications of such sound shifts. In the earliest record of this word in Chinese transcription, the initial was *k'-* and the vocalism of the first syllable was *-w-* + front vowel or diphthong; the second syllable was *tsi*. But about the latter part of the third century, the initial showed aspiration, *k'ʻ-*, and the vocalic elements of the diphthong of the first syllable were reversed—from *-*wi* > **-iu*(?), while at the same time the initial of the second syllable became sonant, i. e. *ts-* > *dzʻ-* (the aspiration of Karlgren's sonants is without significance for comparative purposes).[103] By the sixth century, Chinese transcriptions of this word began to record in the first character the first component of the initial affricate of the second syllable and repeat it in the second character, as if the actual pronunciation the Chinese heard were *k'ʻud-dzi*. This continued into the seventh century, when we also find the initial of the second syllable changing from a sonant dental affricate to a surd palatal affricate, the palatalizing influence perhaps being due to the following front vowel (or diphthong?). Chronologically, we find no conflicting evidence.

The Turkish transcription supports the palatal *k'* initial found in the Chinese transcription, and the Sogdian transcription of the Turkish word shows the same order of back vowel + front vowel that the oldest Chinese transcriptions indicate, although this may be accidental.

In regard to Konow's hypothesis that *kuci* might be a late form of the name Yüeh-chih, it is only necessary to note that while the earliest Chinese transcriptions of "Yüeh-chih" antecede somewhat those for Kucha, they both cover almost the same periods and extend down to T'ang times. Yet the initial in the first syllable for "Yüeh-chih" is always *ng-*, for Kucha always a surd guttural stop. The initial of the second syllable for "Yüeh-chih" was in the earliest record *t'-*, but was replaced by *tś-* sometime before the end of the second century, at which time the initial of the second syllable of the transcription of Kucha was *ts-*. In later periods, the initial of the second syllable of "Yüehchih" continued the same (*tś*), but for Kucha the pronunciation had become *dzʻ-* probably during the close of the third century, and only in T'ang times *tś-*.

Where the first syllable of the Chinese transcriptions ends in a vowel, the Chinese rendering

[90] Lévi, op. cit. (n. 88 above), p. 344.
[91] K 406, 1094.
[92] K 493, 1095.
[93] Lévi, op. cit., 347.
[94] K 493, 1212.
[95] Lévi, 353.
[96] H. W. Bailey, "Ttaugara," BSOS 8 (1937) 918.
[97] Heinrich Lüders, "Zur Geschichte und Geographie Ostturkestans," SBAW (1922) 243, 244.
[98] Op. cit.; dating p. 250.
[99] Pelliot, "Tokharien et Koutchéen," JA 224 (1934) 60, 86 n. Less certain is Skr. *kucika* (var. *kuśika*), perhaps the people of Kucha whom Varāhamihira, in the sixth century, listed among the peoples of the Northeast (Bṛhat-saṃhitā, XIV, 30) after the Cinas and the Khasas (Lévi, JA (1933) 344).
[100] Pelliot, "Note sur les anciens noms de Kucā, d'Aqsu et d'Uc-Turfan," TP, ser. 2, 22 (1923) 127. See Pelliot also for this word adopted in other languages.
[101] Lüders, op. cit., 246.
[102] If *Kuci* was really a Kuchean word.
[103] See "The Vocalism of Sino-Tibetan," JAOS 60 (1940) 309, par. 2.

for "Yüeh-chih" was *-i̯u*, except once *-i̯u̯*, but for Kucha was first *-w-* + front vowel, and only during the third century A. D. *-i̯u̯*.

Where the Chinese transcriptions have a final *-t* for the first character, that for Yüeh-chih always has *-i̯ʷɒt*, that for Kucha always *-i̯uɔt*.

The final vowel of the second syllable of the transcription for "Yüeh-chih" was always *i̯e̯*, for Kucha always *-i*, until T'ang times, when *-i̯e̯* appears.

There was no phonetic agreement between the Chinese transcriptions for "Yüeh-chih" and Kucha on any one phoneme at any time during their history that we know of, until T'ang times, and then only on the second syllable. There is less phonetic resemblance than between *Maggie* and *begging*. We may be sure that at all periods the Chinese were transcribing two different words.

We have seen one identification Kuci = "Yüeh-chih," killed on the first test — the chronological assemblage of the linguistic data and the analysis of its conflicts. We have seen another identification, "Yüeh-chih" = *Kusha, badly scratched on the first test and shattered on the second — phonetic and morphological analysis.

MARGINAL NOTES ON A RECENT VOLUME OF BABYLONIAN MATHEMATICAL TEXTS

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THE MATHEMATICAL texts from Babylonia and Assyria, even though being of considerable interest for the history of our civilization, are treated as a sort of stepchild by Assyriologists as well as by mathematicians. Among the former, only a few are prepared to overcome the initial difficulties presented by the unfamiliar sexagesimal system; the latter, on the other hand, even if they master the cuneiform script sufficiently to decipher the texts, lack that acquaintance with cuneiform literature in general which alone can enable them properly to interpret and to integrate the material. It was, therefore, a lucky initiative which prompted a mathematician and an Assyriologist, O. Neugebauer and A. Sachs of Brown University, to join in the task of editing whatever unpublished mathematical cuneiform texts they could get hold of.[1]

A. TEXTS RELATING TO THE COMPUTATION OF COMPOUND INTEREST.

a. MLC 2078.

In an introductory chapter, the authors explain the classification of the material as used in their volume and briefly acquaint the reader with the measures occurring most frequently in their texts. They then proceed to a discussion of the so-called table-texts, a group the elucidation and interpretation of which we mainly owe to the previous studies of Neugebauer. Among these reckoning tables, a type not yet known from texts published previously is represented by the fragmentary tablet MLC 2078 (transliterated in pp. 35 f., but not reproduced in either facsimile or photograph). The extant text consists of two separate sections, the first of which (ll. 1-4 and left edge, ll. 1-2) contains a list of fractional powers of 16 (namely $16^{1/4} = 2$; $16^{2/4} = 4$; $16^{3/4} = 8$; $16^{4/4} = 16$; $16^{5/4} = 32$; $16^{6/4} = 64$), while in the second six powers of 2 ($2 = 2^1$; $4 = 2^2$; $8 = 2^3$; $16 = 2^4$; $32 = 2^5$; $64 = 2^6$) are enumerated. Sachs and Neugebauer end their brief remarks on this text with the statement: "The starting-point for the whole problem is in all probability to be found in the computation of interest, which is dealt with in several previously published texts." Fortunately, we do not have to be content with guesses and probabilities concerning the use of these tables; for two mathematical problems published previously make it possible to illustrate the practical use of these two reckoning tables, and to demonstrate at the

[1] See O. Neugebauer and A. Sachs, *Mathematical Cuneiform Texts*, with a Chapter by A. Goetze, *American Oriental Series*, vol. 29, New Haven, 1945.

same time that they sufficed to solve all problems concerning compound interest regardless of the rate of interest valid in each individual case.

b. VAT 8528.

We begin with the list of powers of 2, the application of which is exemplified by the tablet VAT 8528.[2] The latter text deals with the following problem: 1 mina of silver was lent at a rate of 12 shekels of interest per mina per year; when the money was returned, capital plus compound interest amounted to 64 minas of silver. It is asked to determine how long the interest was allowed to accumulate. The first operation carried out by our ancient mathematician consists in finding the time after which the simple interest equaled the original capital. With this sum of twice the original loan as initial capital, he then proceeds to calculate the compound interest in accordance with the formula [3]

$$[1] \qquad a \cdot q^n = b.$$

The procedure of capitalizing the interest for the first time when capital and simple interest have become equal reveals a trait most characteristic of the Babylonians' method of computing compound interest: The length of the period after which the initial loan has doubled depends, of course, upon the rate of interest stipulated in each individual contract; whereas at the rate given in our problem, viz., 12 shekels per mina per year, it amounts to 5 years, or one lustrum, we find instances such as, e. g., the Old Assyrian document SAYCE 1 [4] where the initial capital doubled after 4 years, and where, therefore, the annual rate of simple interest was 15 shekels per mina. This period of 4 or 5 years represents the time-unit in which the exponent n in our formula [1] is measured. In modern computations of compound interest, too, n is a multiple of the unit of time (usually a year or 3 months) at the end of which the interest is capitalized. However, in distinction from our modern way of reckoning, n was, in the Babylonian formula, also a function of the rate of interest. Inversely, the factor q, i. e., the amount to which the monetary unit increases within one unit of time, was, in the Babylonian calculation, constant and always equal to 2, whereas in our system of figuring this factor varies in accordance with the rate of interest.[5] In other words, in the Babylonian formula, the variation of the rate of interest affects only the exponent n of the power q^n, whereas in ours the basis q is affected. Hence it becomes manifest that, while our modern bankers must establish for each individual rate of interest a separate reckoning table showing the values of q^1, q^2, q^3, etc., the Babylonian banker needed only one table valid for all rates of interest, namely that containing the powers of 2. We demonstrate his procedure with the help of the example elaborated in our text VAT 8528: As was mentioned before (p. 306a), the value a of the initial capital in the ancient mathematician's compound interest operation is 2, and the value of b, the final capital, is 64. Hence in his case formula [1] takes on this form:

$$[2] \qquad 2 \cdot 2^n = 64$$

$$[3] \qquad 2^n = 32.$$

As the value $n = 5$ could immediately be found in a table such as that preserved in section 2 of the text MLC 2078, all that remained for him to do in order to determine the number of years during which the interest was allowed to accumulate was to reconvert into years the time-unit lustrum in which, as was pointed out before, the exponent n was measured; in other words, he had to multiply $n = 5$, taken from the table, by 5, i. e., the time-unit at the end of which the interest was capitalized, and to add to the product the five years during which the capital had been on simple interest.[6]

[2] The text was transliterated, translated, and discussed by Thureau-Dangin, *RA* XXXIII, 1936, pp. 65 ff.; see also the same author's work *Textes mathématiques babyloniens, Ex Oriente Lux*, Deel I, Leiden 1938, pp. 118 ff.

[3] In the following equation a denotes the initial capital of the compound interest calculation and b the sum of capital and compound interest after n units of time. On the meaning of q see presently.

[4] For a transliteration, translation, and discussion of the text see G. Eisser and J. Lewy, *Die altassyrischen Rechtsurkunden vom Kültepe, MVAeG* XXXIII, Leipzig 1930, no. 157, pp. 144 f.

[5] If, e. g., the rate of interest is 3 per cent, q is equal to 1.03; if it is 4 per cent, q is equal to 1.04, etc.

[6] To be sure, the reckoning table used by the author of VAT 8528 differed from that preserved on the tablet MLC 2078 in so far as it contained only four powers of 2, $16 = 2^4$ obviously being the last item listed in his table; for when determining the exponent n in formula [3], he reckoned as follows:

c. Strasbourg 366, *ll.* 1-5.

We now turn to the problem which illustrates the practical use of section 1 of the tablet MLC 2078 listing six fractional powers of 16. It is preserved in ll. 1-5 of the tablet STRASBOURG 366,[7] and is referred to as follows by Sachs and Neugebauer (p. 36, note 96 d): "It is worth noting that the words '30-e 4 íb-si$_8$,' which appear in line 2 of our present text [i. e., MLC 2078], also occur in Strassburg 366 obv. 4. Unfortunately, although the problem in Strassburg 366 is perfectly preserved, the precise character of the question which is asked and the reasons for the calculations which are carried out remain obscure; it is quite possible that the subject is interest on money." In the light of our previous inferences the "obscurity" surrounding the problem is easily dispelled. The text runs as follows[8]: "[1]Today, I took $2\frac{1}{12}$ (i. e., 2°5′ in sexagesimal writing); [2]what shall I take [1]the next time?[9] [2]You, in your calculation,[10] [3]multiply $\frac{1}{4}$, the constant reciprocal, with 2, the (number of) terms,[11] and [4]this will give you $\frac{1}{2}$; $\frac{1}{2}$ as a power (of sixteen is) 4; (4) multiply by $2\frac{1}{12}$; [5](you obtain) $8\frac{1}{3}$. Divide $8\frac{1}{3}$ by 2: You took $4\frac{1}{6}$."

The calculation carried out by the author of the text can be expressed by the formula

$$[4] \qquad b = \frac{d}{2} \cdot 16^{\frac{1}{4} \cdot 2},$$

where d is the amount "taken today" (l. 1) and b the sum to be taken "the next time" (l. 1). A comparison of this equation with formula [1]

$$[1] \qquad b = a \cdot q^n$$

makes it clear that the operation dealt with in our problem concerned compound interest. A comparison of the two formulae further reveals firstly that the initial capital of the compound interest operation is half the sum "taken today." Since, as we have seen above, in a Babylonian computation the quantity a in formula [1] was twice the amount of the original loan,[12] it is obvious that d was four times that amount. This means that "today" the original loan had quadrupled, which is to say that "today" refers to the time when the interest was capitalized for the second time. From the comparison of equations [1] and [4] it results secondly that the factor q^n is equal to $16^{\frac{1}{4} \cdot 2}$. Since n must, of course, be an integer of the unit of time, i. e., in a Babylonian computation, of the period after which the original loan and its simple interest have become equal, it is manifest that, in our case, q, the amount to which

$$2^n = 2 \cdot 16$$
$$2^n = 2^1 \cdot 2^4$$
$$2^n = 2^{1+4}$$
$$n = 5.$$

Thureau-Dangin, *RA* XXXIII, 1936, p. 68, was so perplexed by the manner in which the ancient mathematician divided 32 by 2 that he qualified this operation as an *énigme*. However, for a person accustomed to reckon in terms of "sexagesimal" numbers, it was quite natural to decompose 32 in 30 + 2, and to divide each of these components separately. We carry out an analogous operation if, when dividing, e. g., 128 by 2, we decompose 128 in the familiar "decimal" number 100 plus 28 and half each of the two components separately.

[7] For a transliteration and translation see Thureau-Dangin, *Textes mathématiques*, p. 205, where the earlier editions and attempts at interpreting the text are listed.

[8] I render the text according to Thureau-Dangin's afore-cited transliteration because the original edition by Frank is not available to me.

[9] That *urram* means not only "the next day," "tomorrow," but also "shortly," "in a short time," "next time," was pointed out by P. Kraus, *Altbabylonische Briefe aus der Vorderasiatischen Abteilung der Preussischen Staatsmuseen zu Berlin, MVAeG* 36, 1, Leipzig 1932, p. 129.

[10] Literally: "in your calculating." Sachs and Neugebauer translate *ina epêšika* by "when you perform (the operations)" (so, e. g., p. 57, l. 4 of the text MLC 1354), to all appearances because Akkadian *epêšu* usually occurs in the sense of "to do." However, when rendering the phrase *atta ina epêšika* which frequently introduces the paragraph of a problem-text containing the solution, it is preferable to translate *epêšu* by "to calculate," because, as is well known, Akkadian *epêšu* is, in all probability, etymologically identical with the West Semitic term *ḥ–š/s–b* which, in Aramaic, Hebrew, and Arabic, serves as a designation for the execution of a mathematical operation.

[11] As is well known, the plural of *ûmu* denotes not only "days" in general but also a specified number of days determined by previous agreement; for example, the end of the term upon the lapse of which a debtor is pledged to pay his debt is frequently referred to as *ûmûšu mal'ûtum*, which means "his (i. e., the debtor's) full days" (see, e. g., B, ll. 11-12, of the Old Assyrian document GIESSEN 1-1, transliterated and translated by Eisser and Lewy, op. cit., I, no. 185, pp. 177 ff.). For the use of *ûmâtum* in the sense of a "fixed period of time" see, e. g., l. 8 of the Old Babylonian contract published as no. 60 by Jean, *Tell Sifr*, Paris 1931, pl. CXXV, transliterated and translated by Schorr, *Urkunden des altbabylonischen Zivil- und Prozessrechts, Vorderasiatische Bibliothek*, vol. V, Leipzig 1913, no. 142, pp. 202 f.

[12] See above, p. 306.

the monetary unit increased within the unit of time, is equal to $16^{1/4}$, or 2, which is, according to our previous conclusions,[13] the constant value of q in all Babylonian computations of compound interest. The remainder of the problem is easy to explain: If q is equal to $16^{1/4}$, the exponent n in formula [4] is obviously equal to 2. This means that *ûmam* and *urram*, "today" and "the next time," were separated from each other by one unit of time. In other words, if, as we have seen before (p. 307), *ûmam* is the time when the original loan had quadrupled, *urram* is the moment when it had octupled, or when the interest was capitalized for the third time. Accordingly, the purpose of the whole operation was to show that, whenever the interest was capitalized, the sum of capital and interest was double of what it had been at the previous capitalization.[14]

It remains to discuss the reasons why the author of our text expresses the constant quantity $q = 2$ as $16^{1/4}$, and why, on the other hand, he refers to the exponent ¼ as "the constant reciprocal." (That the substitution of $16^{1/4}$ for 2 is not a simple play on numbers is best demonstrated by the tablet MLC 2078 where six fractional powers of 16 appear together with a list of integer powers of 2, the use of which for economic purposes was demonstrated previously.) In order to elucidate these questions, we turn to a number of Old Assyrian contracts which, dealing with the investment of money on long terms, were named by the Assyrians for the *naruqqum*, i. e., the "sack," or "pouch," carried by a commercial traveller. The *naruqqum* business was done as follows: An investor entrusted a certain amount of money to the "pouch" of a travelling salesman or a merchant established in one of the outlying provinces of the Assyrian empire; the latter pledged himself to pay, after the expiration of the contract, a multiple of the capital received, the amount depending upon the number of years for which the investment was made. Whatever gains were realized by the salesman beyond the amount guaranteed by him to the investor were divided equally between the capitalist and the merchant.[15] In the aforecited contract SAYCE 1,[16] for example, it is stated that the investor gave the salesman 4 minas of silver, for which the latter, in turn, was compelled to pay, after 4 years, 8 minas of silver. If any gains beyond these 8 minas should accrue to the salesman from the investor's money, they were to be divided to equal parts between himself and the capitalist. A similar transaction is recorded in the document TC 73,[17] though in this instance no mention is made of the term *naruqqum*. Here an investor residing in the province of Cappadocia entrusted a salesman who was about to travel on business to the Assyrian capital with 6 minas, 32 shekels of silver. The latter, on his part, was to credit the investor's account in Aššûr with 2 minas of gold, or 16 minas of silver.[18] Upon his return to Cappadocia, the merchant was to receive from the provincial capitalist another 1 mina, 28 shekels of silver, so that, altogether, he borrowed half the sum he was to return, the period of the investment manifestly extending at least over the time necessary for a trip from Cappadocia to Aššûr and back to Asia Minor. Of particular interest for the proper appreciation of the *naruqqum*-transaction is the letter TC 24 from which it is learned that the travelling salesman who received an investment made out a promissory note which named the amount to be returned by him to the investor after the termination of the transaction and not the initial capital received by him.[19]

[13] See above, p. 306.

[14] In passing it may be remarked that the treatment of this problem by the ancient mathematician comes very close to the introduction of algebraical symbols; for the failure to state a concrete rate of interest and thus a concrete number t of years after which the original loan has doubled, and the use instead of the designations *ûmam* and *urram* for the end of the periods nt and $nt + 1$, respectively, is almost as abstract and general as are our own letter symbols.

[15] For the sake of clarity it may be remarked that these surplus gains realized by the commercial traveller beyond the amount guaranteed to the investor are not identical with the "profit" (*nêmalum*), of which, according to some of our texts, the former was entitled to "eat" (i. e., to use for his living expenses) one third. These and other details of the transaction will be discussed elsewhere.

[16] See above, p. 306 with note 4.

[17] For a transliteration, translation, and discussion see G. Eisser and J. Lewy, op. cit., I, no. 96, p. 78.

[18] On this ratio see below, note 21.

[19] The pertinent lines of the letter TC 24 were transliterated and translated by G. Eisser and J. Lewy, op. cit., I, p. 78, note a; for a further case in which double the original investment was to be returned by the merchant see the text GIESSEN 1-6, transliterated and translated ibidem, no. 216, pp. 207 f. In the text KTHAHN 24 (ibidem, no. 109, pp. 93 ff.), on the contrary, the sales-

Accordingly, the interest to be paid by him on the investor's money was immediately added to the initial loan, so that the face value of the promissory note represented the amount to which the original capital increased after the period of time agreed upon.[20] From the point of view of the present discussion it is important to note that in the case alluded to in the letter TC 24, as well as in the business recorded in TC 73, the face value of the promissory note was 2 minas of gold, the equivalent of which in silver was 16 minas.[21] In fact, there is hardly any *naruqqum*-transaction alluded to in the extant material where the amount to be returned by the salesman to the investor was not 2 minas of gold: We mention, inter alia, the *naruqqum*-business the termination of which is recorded in the document EDINBURGH 1909/587,[22] or the same type of transaction referred to in SCHMIDT 2;[23] further AO 8283 (= TC III 244) and the related texts LANDSBERGER 3,[24] ll. 4, 5, 6, 7, and 8, and LANDSBERGER 4.[25] Occasionally we find 4 minas of gold, i. e., twice the standard amount; so, e. g., in L 17[26] and LANDSBERGER 3, l. 15. If, accordingly, 2 minas of gold, or 16 minas of silver, served as a kind of monetary unit in the investment business, it was a matter of convenience to use this unit, and not the usual standard of 1 mina of silver, in carrying out calculations relating to invested money. That this was actually done is shown by the afore-discussed problem-text STRASBOURG 366, ll. 1-5, which makes it at the same time clear why amounts both smaller and larger than 16 minas of silver were expressed as fractional powers of 16 and not simply as fractions or multiples of this number: In the computation of compound interest, the squaring, cubing, etc., of the factor q of our equation [1] played an important rôle; and while it was very easy to square or cube a fractional power of 16 such as $16^{1/4}$, it required a rather complicated operation to square or cube a fraction such as $\frac{1}{8}$, particularly in the sexagesimal system where the latter fraction appears as 7′30″. Since, on the other hand, the factor q was in all Babylonian computations of compound interest equal to 2, or $16^{1/4}$, the author of the problem-text STRASBOURG 366, ll. 1-5, was perfectly justified in designating the exponent $\frac{1}{4}$ as a "constant" reciprocal. By the same token it becomes manifest why

man was to pay 1½ times the amount he received from the investor.

[20] Thus the Assyrian practice was exactly that used by our government with the defense bonds issued during the war; the face value of such a bond includes, as is well known, the amount originally paid by the investor plus 3⅓% of simple interest for 10 years. The rate of interest differs, of course, considerably between ancient and modern times, because the overland traffic to the Assyrian border-provinces offered untold opportunities for an enterprising merchant.

[21] Besides the references for this ratio quoted by Eisser and Lewy, op. cit., p. 78, note a, see, e. g., TC 70, ll. 1-6, where 2 minas of gold are expressly valued at 16 minas of silver, or ROSENBERG 2 (quoted by J. Lewy, *OLZ* XXIX, 1926, col. 753, note 2) and WAG 2 (unpublished), ll. 8-9, where the shekel of gold is said to have cost 8 shekels of silver. Fluctuations in the price of gold were, however, not precluded. Thus in the letter CCT III 47[a] a merchant advises his correspondent (in ll. 5 ff.) to purchase for him half a mina of gold if the shekel of this metal could be had for 8 or 9 shekels of silver. In CCT III 22[a], on the other hand, two different qualities of gold are priced at 7⅓ (so in l. 8) and 8⅔ (so in ll. 10 f.) shekels of silver per shekel of gold. According to KTS 52[b] (l. 2), in turn, 7 shekels of silver were paid for each shekel of gold. A major difference between the gold-silver ratio in the Assyrian capital and in the province of Cappadocia as postulated by Landsberger, *Türk Tarih, Arkeologya ve Etnografya Dergisi* IV, 1940, pp. 25 f., did not exist. If, as is sometimes the case, the shekel of gold is valued at only 4 or 5 shekels of silver (see, e. g., TC II 3, ll. 26-29), the metal in question was intended for the goldsmith who, much as in our day, needed a gold-alloy less fine than that used as a monetary standard (gold coins in this country as well as elsewhere contain 21.6 carat, which means 900 parts of gold and 100 parts of alloy; gold objects, on the other hand, contain from 14 to 18 carat, i. e., from 583⅓ to 750 per thousand of fine gold). That this is so is shown with particular clarity by an economic text from Mâri cited by Dossin, *Syria* XX, 1939, p. 107; there 13½ shekels, 8 grains of gold for the coating of a weapon for the god Dagan were purchased for only 1 mina of silver, which gives a purchase price of 4.43 shekels of silver for the shekel of gold, which means almost exactly that mentioned in the afore-cited text TC II 3.

[22] See Eisser and Lewy, op. cit., II, Leipzig 1935, no. 328, pp. 102 ff.

[23] See Eisser and Lewy, op. cit., I, no. 246, pp. 259 ff. In this case, the investment consisted of 700 minas of copper which amount, at the rate of about 70: 1, had a value of 10 minas of silver.

[24] We so refer to an unnumbered tablet from the Museum at Kayseri which was published in transliteration and translation by Landsberger, loc. cit., pp. 20 f.

[25] This text, which belongs to the Ankara Museum, was transliterated and translated by Landsberger (loc. cit., p. 26) who, here again, failed to mention the number of the tablet.

[26] See Eisser and Lewy, op. cit., II, no. 310, pp. 33 f.

section 1 of the table-text MLC 2078 contains only those fractional powers of 16 in which the exponent is a multiple of ¼: since the factor q in equation [1] is, as we repeatedly mentioned, always equal to 2, or $16^{1/4}$, and as the exponent n must be an integer of the unit of time, q^n could have no value other than $16^{n/4}$. Hence we come to the result that the Babylonian banker actually needed nothing but the two tables preserved on the tablet MLC 2078 in order to solve any problem relating to compound interest, regardless of whether he based his calculation on the smaller monetary unit of 1 mina of silver or on the larger of 2 minas of gold.

We terminate our discussion of the texts dealing with compound interest by calling attention to a passage of the Old Assyrian text VAT 13509 where we read: [5]*a-na kaspim ṣí-ip-tám* [6]*ú ṣí-pá-at ṣí-ip-tim* [7]*ki-ma a-wa-at na-ru-a-im* [8]*i-lá-qí-ma,* "[5]On the money [8]he will take [5]interest [6]and interest of the interest [7]in accordance with the wording of the stone-inscription."[27] As col. XXIV r, ll. 75 ff. of Ḥammu-rapi's Code suggest that Babylonian *narûm,* Assyrian *narua'um,* "stone-inscription," was a designation of a legal code, these lines indicate that the cases in which compound interest could be charged were determined by law.

B. IGI-GUB-BA-VALUES AND THEIR PRACTICAL APPLICATION (YBC 5022 AND YBC 7243).

The first specimens of still another group of table-texts hitherto unknown are represented by the tablets YBC 5022 and YBC 7243 (pp. 132 ff. of the volume here reviewed[28]). While each of the two tablets is divided into two columns, only on YBC 5022 these columns bear headings describing their contents. The left-hand column is entitled *igi-gub-ba,* "(List of) constant reciprocals," and the right-hand side is defined by its superscription as *ša né-pi-iš-tum,* "what the (relevant) operation is."[29] In other words, the tables list on the left side a number of constant factors and indicate on the opposite side the mathematical operation in which they play a part. In order to illustrate the use of these constants and thus the purpose of the two table-texts, we discuss the items listed in l. 58 of YBC 5022 (= l. 35 of YBC 7243), and l. 2 of YBC 7243,[30] because the practical application of both of them is exemplified by texts contained in Neugebauer's and Sachs' book.

a. YBC 8600 *and VAT* 8522, *no.* 1.

The former of these two "constant reciprocals" is the subject of the text YBC 8600 (pp. 57 f.) which runs as follows: "[1]1 cubit (was) the circumference of a wood(en log). [2]How thick was it? [3](As for) you, square 5 (fingers) with 5 (fingers), and [5]you shall multiply (the resulting) [4]25 (square fingers) with ⅔₅ (i. e., 4′48″ in sexagesimal writing), the constant reciprocal, [5]and (you will obtain) 2. 2 *qû* (is) the thickness of the wood(en log)." The second part of the text dealing with the inverse problem can be rendered thus: "[6]2 *q*[*û* (is) the thi]ckness of a wood(en log). [7][The circumfer]ence of the wood(en log is) what? [edge 1](As for) yo⟨u⟩, the reciprocal of ⅔₅, [2](which is) [2]⅖ (i. e., 12°30′), [rev. 1]multiply by 2 *qû,* and [2](you will obtain) 25; the square root of 25 [3](is) 5. 1 cubit (is) the circumference of the wood(en log)." The measuring of wooden logs in *qû*-units, which was previously known from texts such as the Old Babylonian letter B. M. 26234 (= *VAB* VI, no. 52; on this letter see Landsberger, *ZDMG* 69, 1915, pp. 503 f.), was, no doubt, prompted by the necessity of carving standardized *qû*-vessels out of cylindrical pieces of timber. As our text does not mention the length of the log (corresponding to the height of the vessel to be constructed), it is manifest that this dimen-

[27] The relevant lines of this unpublished tablet were communicated in transliteration and translation by Eisser and Lewy, op. cit., II, p. 75, note c.

[28] It is hard to see why Sachs and Neugebauer bring these texts under the heading "Problem-Texts." If many of the items listed therein still represent a "problem" to modern interpretation, they certainly did not to the Babylonian mathematicians.

[29] The far-fetched proposal of Sachs and Neugebauer to read these two headings as one single item not only causes grammatical difficulties but is in striking contradiction with the tablet itself on which, to judge by the photograph on plate 44, the clause beginning with *ša* clearly heads the second column which is separated from the first by a considerable space.

[30] Probably = YBC 5022, l. 21; for so far as I can see on the photograph (plate 44) as well as on Sachs' and Neugebauer's copy (pl. 18), the restoration of the damaged first sign of l. 21 to 15 is more likely than that to 45 tentatively proposed by the authors on p. 134. If my reading is correct, YBC 5022 simply unites in l. 21 the two items which YBC 7243 lists separately in ll. 2 and 3.

sion did not enter into the calculation, which means, all *qû*-vessels had the same height, and only the area of their bottom varied; in other words, one *qû*, two *qû*, or three *qû* vessels were distinguished from each other only by the size of their bottom, the 2 *qû* bottom being twice the size, and the 3 *qû* bottom being 3 times the size of the 1 *qû* bottom. Once this preliminary conclusion is derived from the failure of our text to mention the length of the log, the operation carried out by our ancient mathematician is easy to understand: If the circumference of the log measured 1 cubit, or 30 fingers, its radius was $^{30}/_{2\pi}$ fingers, or, with $\pi = 3$, 5 fingers. This radius of 5 fingers length determined, according to our text, the bottom of a 2 *qû* vessel, a relation which explains at the same time the origin of the constant factor $^{2}/_{25}$; for since our text gives us c (the capacity of a cylindric vessel) $= 2$ *qû* and r (the radius of its bottom) $= 5$ fingers, while h, the height of the vessel, is not mentioned, the equation

$$[5] \qquad c = r^2 \cdot \pi \cdot h$$

takes on the form

$$2 = 25 \cdot \pi \cdot h$$

$$[6] \qquad \pi \cdot h = {}^{2}/_{25}.$$

If, accordingly, the wood-carver wanted to determine the capacity n, measured in *qû*-units, of a vessel made by him in standard height, he simply had to determine the radius of its bottom, square it, and multiply the square with the constant factor $^{2}/_{25}$, which product was equal to n, the number of *qû*-units held by his vessel; for

$$r^2_n \cdot \pi \cdot h = n \ qû\text{-units},$$

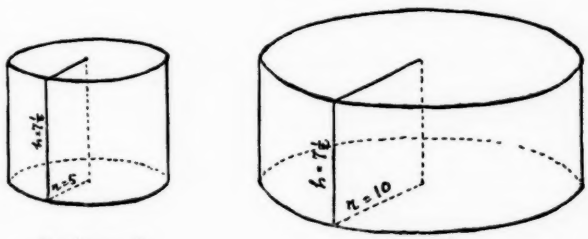
and, $\pi \cdot h$ being, according to equation [6], equal to $^{2}/_{25}$,

$$[7] \qquad r^2_n \cdot {}^{2}/_{25} = n \ qû\text{-units}.$$

If, inversely, he wanted to find out how large a bottom he had to give a vessel which was to hold n *qû*-units, he multiplied n with the reciprocal of the constant factor $^{2}/_{25}$ (i.e., he found $n \cdot 12\frac{1}{2}$), and determined the square root of this product which directly furnished him the radius of his n *qû* vessel; for from equation [7] it follows that

$$[8] \qquad r_n = \sqrt{n \cdot 12\tfrac{1}{2}}.$$

The method for the construction of graduated vessels implied by our text had a very obvious advantage: If the Babylonian mathematicians fixed the unit 2 *qû* as the capacity of a vessel with a bottom radius of 5 fingers and a constant height,



2 *qû* vessel 8 *qû* vessel

Fig. 1

they could construct any given size *qû* vessel according to this standard vessel by merely determining the ratio of the square of its bottom radius to the square of the bottom radius of the 2 *qû* vessel. If r_2 denotes the radius of the latter and r_n that of a vessel holding n *qû*-units, the following relations hold:

$$r^2_2 \cdot \pi \cdot h = 2 \ qû$$

$$r^2_n \cdot \pi \cdot h = n \ qû$$

$$\frac{r^2_2}{r^2_n} = \frac{2 \ qû}{n \ qû}.$$

Accordingly, the ratio π, a good approximation of which the Babylonians had not yet been able to find, was eliminated from the calculation of the dimensions of graduated *qû*-vessels.[31] In other words, the *qû*-vessels constructed according to the formula given above were *exact* multiples or fractions of the 2 *qû* standard vessel, because the

[31] One might object to this conclusion that, when finding the circumference of the bottom from the radius or, vice versa, the radius from the circumference, the incorrect Babylonian π enters after all into the calculation. It will, however, be noted that, even though our text begins by computing the radius from the circumference, this latter parameter plays no rôle whatever in the subsequent calculation or in the determination of the "constant reciprocal" $^{2}/_{25}$. This is, in fact, quite natural; for the wood-carver who drew a circle on the smoothed cross-section of his log in order to begin carving out his *qû*-vessel constructed that circle with a given radius or diameter but not with a given circumference. Hence the introduction of the circumference in our text appears to be nothing but an artifice meant to make the problem slightly more difficult.

inexact Babylonian π did not enter into their determination.[32]

The interpretation of YBC 8600 attempted by Neugebauer and Sachs is erroneous, as is best shown by their result that the constant reciprocal written in our text 4′48″ (i. e., as was pointed out before, $\frac{2}{25}$) is "incorrect," the "correct" value, in their opinion, being 5. Their failure is due to various causes. In the first place, it is a far-fetched assumption that the log from which a 2 *qû* vessel was to be carved be measured in terms of *GAR*-units. I wonder whether the authors would measure the dimensions of a milk bottle in miles or whether they would not find it more convenient to use a small unit such as the inch or the centimeter. Their principal error, however, lies in the application to the case here under discussion of what they describe as "the firmly established relation" 1 *qû* = $\frac{1}{18000}$ volume *SAR*, or 216 cubic fingers, which ratios are figured out in accordance with certain Babylonian stereometrical problems. As I pointed out repeatedly[33] against the violent opposition of A. Sachs, the *qû*-measure does not originally belong into the Babylonian sexagesimal system of measures, and hence could not be brought into simple, integer relations with the measures of length and of volume without being trimmed down by about one fourth of its size. The text YBC 8600 fully confirms this view; for by showing that graduated *qû*-vessels were of cylindrical form, our problem makes it clear that the Babylonians were unable to express, with any degree of precision, the cubical contents of a *qû* in terms of a measure of volume because their determination of π was inexact. Therefore all attempts at converting *qû*-units into volume *SAR* or cubic fingers led merely to approximations which were worthless when a formula for the construction of graduated *qû*-vessels for practical usage was to be found. Sachs and Neugebauer indirectly admit this when they state that the "firmly established relation" between *qû* and volume *SAR* is incompatible with the constant factor 4′48″ occurring in our problem text as well as in the two afore-cited *igi-gub-ba*-lists.

It may be added that the *qû*-value established by me in the afore-cited article (viz., 1 *qû* = 1340 cubic centimeters) makes it possible to determine the standard height common, as we have seen before, to the graduated *qû*-vessels of various sizes. It amounts to ¼ of a cubit, or 7½ fingers. Accordingly, the standard 2 *qû* vessel had a bottom radius of 5 and a height of 7½ fingers.

Neugebauer and Sachs (p. 59 and note 152 l) compare our text YBC 8600 with problem no. 1 of the tablet VAT 8522, because the latter is "the only other mathematical text which involves the «thickness» of logs." Though seemingly justified by a common terminology—both texts refer to the volume of a log as its "thickness" and both measure that "thickness" in *qû*-units—, the comparison is not pertinent. For whereas the redactor of YBC 8600 develops, as we have seen, an ingenious and exact method of constructing graduated cylindrical vessels, the author of VAT 8522, no. 1, is one of those Babylonian mathematicians who take an obvious pleasure in reaching a correct, or nearly correct, result by using an incorrect formula, or rather a formula applicable in only one single instance.[34] The problem is this: The trunk of an *erinu*-tree, that is, the frustum of a right, circular cone, has a height of 5 *GAR*, a larger, lower cross-section of 64 *qû* and a smaller, upper one of 8 *qû*. The whole stem is said to sell for 200 shekels of silver. It is asked to compute the size of a log to be cut off from the upper part of the trunk which would bring 20 shekels of silver. In other words, the student is required to find one tenth of the volume of the trunk.

The conclusions previously derived from the problem YBC 8600 make it easy to determine that volume according to a correct formula. If a 2 *qû*

[32] Our text with its implications disposes at the same time of the hasty assertion of Oppenheim (*Archiv f. Orientf.* XII, 1937-39, p. 358) that the ancient Semites lived "in einem Zeitalter, das keine genaue Aichung der Massgefässe kannte." If this dictum should be based upon the observation that not every Old Assyrian household possessed a graduated *karpatum*-vessel, it might be well to remind Oppenheim that, even today when graduated vessels are available everywhere, the average housewife measures her sugar in any cup she has ready at hand without asking whether this cup holds exactly half a pint; the modern physician, on his part, advises his patient to take one or two table-spoons of medicine without having previously determined whether the spoon used by the person in question holds precisely half a fluid ounce.

[33] See *JAOS* 64, 1944, p. 65, note 5, and *BASOR* 98, 1945, pp. 25 f.

[34] For a discussion of other such cases as preserved on the tablet B. M. 85194 see Thureau-Dangin, *RA* XXIX, 1932, p. 88, and cf. p. 84, note 1; see further Vogel, *Archiv f. Orientf.* VIII, 1932-33, pp. 220 f.

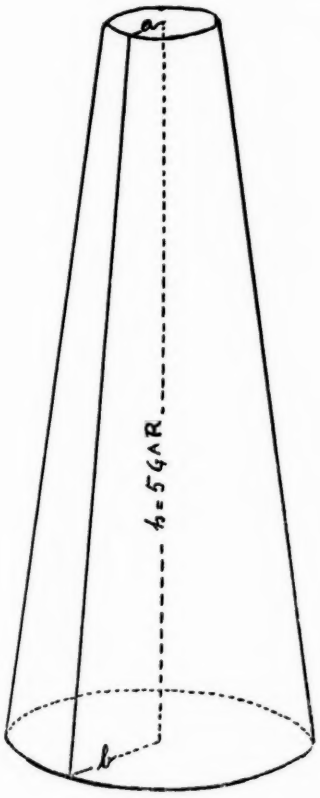


Fig. 2

vessel has a radius of 5 fingers (see above p. 311), an 8 *qû* vessel has, according to formula [8] (above, p. 311), a radius of 10 fingers, while a 64 *qû* vessel has a radius of $20\sqrt{2}$ fingers. As the height of the tree is equal to 5 *GAR*, or 60 cubits, or 1800 fingers, the volume of the trunk, measured in cubic fingers, is expressed by the equation

$$V_f = \tfrac{1}{3}\pi \cdot 1800 \cdot [10^2 + (20\sqrt{2})^2 + 200\sqrt{2}],$$

which furnishes

$$V_f = 2.229.500 \text{ cubic fingers.}$$

As the "correct" *qû* contains approximately 289 cubic fingers,[35] the volume V_q expressed in *qû*-units is

$$V_q = 7714.5\ q\hat{u}.$$

This number being about 180 times the amount of 45 computed for the whole volume by the author of our text, it is manifest that he expressed his result in a measure of capacity larger than the *qû*. The factor 180 by which our result is to be divided in order to be approximately equal to his immediately suggests that this larger unit is the *kurru* which was reckoned by the Babylonians at either 180 or 300 *qû*. If we assume that the former ratio was that envisaged by our ancient mathematician,[36] we obtain

$$V_k = \frac{7714.5}{180} = 42.8\ kurru,$$

one tenth of which, i. e., the number required in our problem, is 4.3 *kurru*. After we have thus ascertained that our Babylonian savant's result (ll. 7a-8a, cf. ll. 8 and 1 c) is nearly correct—he obtains 45 for the whole and 4½ for the tenth part of the stem—, we proceed to an analysis of his method.

From the legend accompanying the diagram of the truncated cone on the tablet it follows that, in line with the stereometrical method referred to above (p. 312), our mathematician conceived the *qû* as a cube; for there he states that the cube-roots (*ba-si*[37]) of 8 and 64, i. e., of the two bases of the frustum, were 2 and 4, respectively. This statement is further specified in l. 1a where he says: *6 a-na ba-si* [*i-ši*], "[multiply] 6 with the cube-roots;" this means that the side of his *qû*-cube was taken to be 6 fingers long, so that, in accordance with what Sachs and Neugebauer call "the firmly established relation" (see above, p. 312), his *qû*-cube comprised 216 cubic fingers. However, for reasons which will presently become clear, the multiplication of the cube-roots by 6 is not carried out. Instead, the redactor of our problem continues to reckon with the *basi*-values $a = 2$ and $b = 4$ which, as is shown by his volume-formula to be discussed below (see p. 314 and equation [9]), are taken by him to be the radii of the bases of the frustum. This way of operating is bound to lead to an approximative, but not to an exact determination of these radii; for, as will be easily realized from formula [8] and our calculation above, p. 313a, the 8 *qû* radius and the 64 *qû* radius

[35] As 1 centimeter is equal to ⅗ of a finger, 1 cubic centimeter is equal to $^{27}/_{125}$ of a cubic finger. Hence 1 $q\hat{u} = 1340$ cubic centimeters (see above, p. 312) is equal to about 289 cubic fingers.

[36] For the probable reason why he chose this ratio see below, p. 314 and note 39.

[37] For the correct reading of this legend see Neugebauer and Sachs, op. cit., p. 59, note 152 l.

are not exactly twice and four times as long as the 1 *qû* radius. On the other hand, it is important to note that, by failing to multiply the cube-roots $a = 2$ and $b = 4$ by 6, the Babylonian savant virtually introduces the side of his 1 *qû* cube as a new unit of length which, for the sake of convenience, we shall designate hereafter as the "length *qû*." [38] For provided that he also computes the third dimension, viz., the altitude of the frustum, in terms of this unit, he obtains the volume of the tree directly in *qû*, thus saving himself the inconvenience of first converting his parameters into fingers and subsequently reconverting the cubic fingers into *qû*. That the height as occurring in his calculation was actually measured in length *qû* follows from l. 4a, where it is taken to be equal to 5: if the 5 *GAR* (or $5 \times 12 \times 30$ fingers) given for the altitude of the stem in l. 1 of our problem are expressed in length *qû*, the result is $5 \times 12 \times 5$, or, in sexagesimal writing, 5'. However, since our previous calculation has shown that our author's final result is measured in *kurru*-units of 180 *qû* each, we must expect that in his calculation, as previously in ours, the number of *qû*-units contained in the stem is divided by a constant $c = 180$, or, in sexagesimal writing, 3'. Hence he enters into the computation of the volume V_k expressed in *kurru* with the following magnitudes: a (the radius of the small base) $= 2$; b (the radius of the large base) $= 4$; h (the height) $= 5'$; c (the ratio *kurru*: *qû*) $= 3'$. Now the manner in which he proceeds can be expressed by the formula

$$[9] \qquad V = h \cdot \left(\frac{a+b}{2}\right)^2 \text{ or}$$

$$[9a] \qquad V_k = 5' \cdot \left(\frac{2+4}{2}\right)^2.$$

In order to understand how this perplexing formula can furnish a correct result, we must remember that, as was shown by Vogel in the article quoted above, note 34, the Babylonians computed the volume of the frustum of a regular square pyramid by means of the formula

$$V = h \cdot \left[\left(\frac{a+b}{2}\right)^2 + \tfrac{1}{3} \cdot \left(\frac{b-a}{2}\right)^2\right].$$

This formula is, of course, equally applicable to the frustum of a cone if the radii of its bases are equal to the sides of the squares forming the bases of the truncated pyramid and if, moreover, the right hand side of the equation is multiplied by π. Hence one should expect the redactor of our text to have operated in accordance with the formula

$$V_k = \frac{h \cdot \pi}{c}\left[\left(\frac{a+b}{2}\right)^2 + \tfrac{1}{3} \cdot \left(\frac{b-a}{2}\right)^2\right].$$

As the Babylonians equate π with 3, the constant factor $\frac{\pi}{c}$ becomes $\frac{3}{3'}$; [39] hence there remains

$$[10] \qquad V_k = h \cdot 1'\left[\left(\frac{a+b}{2}\right)^2 + \tfrac{1}{3} \cdot \left(\frac{b-a}{2}\right)^2\right].$$

As in our case, with $b = 4$ and $a = 2$, the second item in the bracket is equal to $\frac{1}{3}\left(\frac{4-2}{2}\right)^2$, or $\frac{1}{3}$, formula [10] is reduced to

$$V_k = h \cdot 1'\left[\left(\frac{a+b}{2}\right)^2 + \tfrac{1}{3}\right]$$

$$[11] \qquad V_k = 5 \cdot \left[\left(\frac{2+4}{2}\right)^2 + \tfrac{1}{3}\right]$$

$$V_k = 5 \cdot [9 + \tfrac{1}{3}].$$

A comparison of formulae [9a] and [11] makes it clear that the redactor of our text actually operated with the correct equation [10], but that he considered the second item in the bracket so small in comparison with the first that it could be disregarded. Hence equation [11] assumes the form

$$V_k = 5 \cdot 9$$

$$V_k = 45.$$

The application of a formula such as [9] which, as we mentioned before, is justified only if

[38] Expressed in this unit, the correct radius of the smaller base is $a = 1\frac{0}{6}$, or $1\frac{2}{3}$ (instead of 2 as assumed in the text) and that of the larger base $b = \frac{20\sqrt{2}}{6}$, or 4.71 (instead of 4).

[39] This simplification of the calculation is probably the reason why the author of our text expresses his result in *kurru* of 180 *qû* instead of using the homonymous measure containing 300 *qû* which was by far more common in the Old Babylonian period than was the former. That different kinds of *kurru*-measures were actually in use in the Old Babylonian period follows from specifications such as "so and so many *kurru* in the Šamaš-measure," which occurs frequently in the contracts from Sippar; see, e. g., CT VIII 7[a], l. 20; 10[b], l. 14; 14[a], ll. 16 f.; 17[b], l. 12.

$\frac{b-a}{2}$ is either 0 or 1, is not the only feature which our text shares with B.M. 85194 with which it was compared above.[40] In ll. 3a and 6a, our author introduces the factors 9 and $6\frac{2}{3}$ (6°40′),[41] the product of which is equal to 60; since thus they have no bearing whatever upon the course of the operation, they merely serve to complicate a very simple calculation. Our mathematician, therefore, exhibits the tendency which Thureau-Dangin, in discussing one of the problems preserved on B.M. 85194, described as follows: "Le problème est simple, mais le scribe l'a compliqué à plaisir." The same can be said of col. b, ll. 1-4 of our text, where, after having introduced the fake-factor $6\frac{2}{3}$ just characterized to which he subsequently refers as *nalpattum*,[42] "that which has been written down (to be remembered later)," he determines how many units of volume could be purchased for 20 and 16 units of silver, respectively. This calculation is, of course, as irrelevant for the main operation and, therefore, as misleading as is the remark in l. 8a that $4\frac{1}{2}$ ⟨*kurru*⟩ of wood would have to be cut off from the "upper end" of the stem; for if the wood is sold according to volume, it evidently makes no difference whatever whether $4\frac{1}{2}$ *kurru* are taken from the upper or the lower end of the tree. Finally the spelling *ši-du* (in l. 4a) of the word obviously denoting the altitude of the trunk is meant to bewilder the reader; for, as was remarked by Neugebauer in his first edition of the text, this group of signs could be read *šiddum*, "altitude," as well as *igi-gub*(*-ba*), "constant reciprocal."[43] Hence one cannot help citing in regard to the author of our problem what Thureau-Dangin said of the redactor of B.M. 85194: "On peut se demander si le rédacteur de la tablette BM 85194 n'a pas parfois voulu mystifier ses lecteurs."[44] The reason why some of the ancient mathematicians took such pleasure in misleading their readers must be sought in the belief of the Babylonians that wisdom and knowledge as requisite for the acquisition of higher learning were a privilege of the gods which they revealed to only a few carefully selected human beings. How jealously these persons who were initiated into the secrets of the gods guarded their sacred possession from the laymen is clearly indicated by the formula: "May the initiated show (it) to the initiated; may the uninitiated never see (it); interdiction of such and such a deity,"[45] which is found on many tablets recording the ritual of a certain class of priests, but also on a mathematical text such as the *Esagila*-tablet. That the redactor of VAT 8522 admirably succeeded in concealing his knowledge not only from the *lâ mudû* but even from mathematicians and Assyriologists is evidenced by a remark of Neugebauer and Sachs (p. 59[a]), according to which his treatment of problem 1 "is still obscure despite all efforts to penetrate the calculations made by (sic) the text."

b. Igi-gub-ba-Values of Segments of a Circle.

(α). MLC 1354 and the Square-Segment.

When we mentioned above (p. 310) that also the constant reciprocal listed in YBC 7243, l. 2, is exemplified by a text contained in the collection here reviewed, we referred to the tablet MLC 1354 treated by Sachs and Neugebauer in pp. 56 f. The text which the ancient scribe accompanied by a drawing showing the segment of a circle above a straight line, states the problem as follows: [1]*Askaru* ⅔[*šiddim pûtum*[46]] [2]*i-na pûtim 5 GAR a-sú-u*[*ḫ-ma*][47] [3]*1 ikû* 12½ *SAR eqlu* [4]*šiddum pûtum mi-nu* "[1]A crescent (i. e., the segment of a circle). ⅔[of the longer side (was) the shorter side]; [2]from the shorter side I subtrac[ted] 5 *GAR*, [and (then)] [3]the (crescent-)area (was) 1 *ikû* 12½ *SAR* (i. e., 112½ *SAR*). [4]What (were) the longer side (and) the shorter side?"

The use of the terms *šiddum* and *pûtum* which, in the geometrical problem-texts, denote either the sides of a rectangle or the altitude and the

[40] See above, note 34.

[41] On this factor see also l. 2b and our discussion of col. b below.

[42] I suggest this reading instead of Neugebauer's *na-pa-di-im*.

[43] Examples of the spelling *igi-gub* in cases where "constant reciprocals" are referred to were listed by Thureau-Dangin, *Textes mathématiques*, p. 240.

[44] See *RA* XXIX, 1932, p. 84, note 1.

[45] For a list of texts containing this formula or variants of it see Zimmern, *ZDMG* LXXIV, 1920, p. 433, note 1.

[46] No restoration of this line was attempted by Sachs and Neugebauer.

[47] The subsequent operation carried out by the author of our text shows that Sachs' and Neugebauer's proposed restoration (p. 56, note 152 b) is untenable.

base of a triangle[48] suggest that not only the "crescent" but also a rectangle or a triangle are involved in our problem. If this is so, the parameters given are to each other in the following relation:

$$[12] \qquad x \cdot (\tfrac{2}{3}x - 5) = s \cdot c,$$

in which x denotes the *šiddum* (i. e., either the longer side of the rectangle or the altitude of the triangle), and, according to ll. 1-2, $(\tfrac{2}{3}x - 5)$ the *pûtum* (i. e., either the shorter side of the rectangle or the base of the triangle), while s is the area of either the rectangle or the triangle; c, in turn, is a constant factor which, in the case of a rectangle, is equal to 1 and in the case of a triangle equal to 2. From equation [12] it follows that

$$\tfrac{2}{3}x^2 - 5x = s \cdot c$$
$$[13] \qquad x^2 - \tfrac{3}{2} \cdot 5x = \tfrac{3}{2}s \cdot c.$$

The correctness of the supposition leading to equation [13], viz., that *šiddum* and *pûtum* in our problem refer to the parameters of a rectangle or a triangle, is proved by the fact that the first steps made by our ancient mathematician are in accordance with this equation. He begins by taking the reciprocal of $\tfrac{2}{3}$, which is $\tfrac{3}{2}$, and multiplies it by the "crescent"-area $a = 11\,2\tfrac{1}{2}$,[49] on the one hand, and by 5, on the other. The former multiplication, when compared with the right-hand side of equation [13], makes it clear that s, the area of the rectangle or triangle in question, is either identical with, or a multiple of, the area a of the "crescent." In other words, it becomes apparent that a relation is to be established between the "crescent"-area a and the area of a rectilineal figure such as a rectangle or a triangle. Our Babylonian savant continues his operation by multiplying by 4 the product $\tfrac{3}{2}a$,[50] but he also envisages a multiplication of $\tfrac{3}{2}a$ by 2, for he advises his reader to write down $^{6}7\tfrac{5}{4} \cdot 2 = 33\,7\tfrac{1}{2}$, or $5'37°30'$, in order to have this number on hand for a subsequent computation.[51] We thus realize that he plans to carry out two operations: In the first, he equals the product $s \cdot c$ of equation [13] with the quadruple of the "crescent"-area, i. e.,

$$[14] \qquad s \cdot c = 4a;$$

this means that he intends to determine the sides of a rectangle, the area of which is four times the "crescent"-area. But he further envisages an operation in which

$$[15] \qquad s \cdot c = 2a;$$

in other words, in his second operation he attempts to find either a triangle the area of which is equal to the "crescent"-area, or a rectangle the area of which is twice the "crescent"-area.

If we first introduce the value of $s \cdot c$ from equation [14] into equation [13], we obtain

$$[16] \qquad x^2 - \tfrac{3}{2} \cdot 5x = \tfrac{3}{2} \cdot 4 \cdot 11\,2\tfrac{1}{2}$$
$$[17] \qquad x = 1\tfrac{5}{4} \pm \sqrt{(1\tfrac{5}{4})^2 + 675}.$$

Once more, our formula [17] agrees with the operations carried out by the ancient mathematician. He halves $1\tfrac{5}{2}$, squares the result,[52] and adds this square to 675.[53] The remainder of the text is destroyed, but the sequence of the calculation is beyond doubt:

$$x = 1\tfrac{5}{4} \pm 10\tfrac{5}{4}$$
$$x = 30.$$

Leaving aside the negative solution, we thus realize that x, the *šiddum*, is equal to 30, while the *pûtum*, being $\tfrac{2}{3}x - 5$, is equal to 15. Thus our author has computed a rectangle with the sides 30 and 15, the area of which is four times the "crescent"-area.

It remains to discuss the question as to whether the *šiddum* and the *pûtum* of the rectangle thus determined have any connection with the dimensions of the "crescent" which obviously forms the nucleus of our problem. Sachs and Neugebauer answer this question with an ignoramus by stating (p. 57[b]): "We do not know how to interpret this in the geometrical context of the problem." Yet, it is not all too difficult to find that interpretation: If we inscribe an equilateral polygon in a circle and want to compute the area of the segment cut off from the circle by one side of the polygon, we

[48] See Thureau-Dangin, *Textes mathématiques*, p. 226, s. v. *šiddu*, and p. 224, s. v. *pûtu*.

[49] I. e., $\tfrac{3}{2} \cdot 11\,2\tfrac{1}{2} = 67\tfrac{5}{4}$, or, in sexagesimal writing, $2'48°45'$.

[50] I. e., $4 \cdot 67\tfrac{5}{4} = 675$, or, in sexagesimal writing, $11'15°$.

[51] For no conceivable reason Sachs and Neugebauer, p. 57, note 152 d, propose to shift the phrase *mišil-šu šukun* from l. 7 to l. 9 where it would be superfluous.

[52] $1\tfrac{5}{2} : 2 = 1\tfrac{5}{4}$ or $3°45'$; $(1\tfrac{5}{4})^2 = 2\tfrac{25}{16}$ or $14°3'45''$.

[53] $2\tfrac{25}{16} + 675 = 11\tfrac{025}{16}$ or $11'29°3'45''$.

subtract from the area of the sector standing upon the arc of the segment the area of the triangle formed by the chord of the segment and the two radii passing through the points in which the chord cuts the circle. In other words,

$$segment = sector - triangle.$$

In case the equilateral polygon is a square, the segment-area (referred to hereafter as *segm.*$_4$) is expressed by the following equation:

$$segm._4 = \frac{r^2\pi}{4} - \frac{r^2}{2}$$

[18] $$segm._4 = \frac{r^2}{4}(\pi - 2).$$

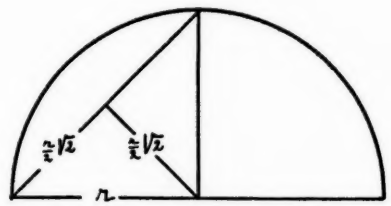


Fig. 3

If we assume for a moment that the "crescent" dealt with in our problem was one of the segments cut off by an inscribed square, we can use equation [18] to find the radius of the circle from which our segment is cut off. We thus obtain

$$112\tfrac{1}{2} = \frac{r^2}{4}(\pi - 2),$$

or, since, as we have mentioned above, the Babylonians reckoned with $\pi = 3$,

$$225/2 \sim \frac{r^2}{4}$$
$$r \sim 15\sqrt{2}.$$

As the side of the inscribed square, or the chord of the square-segment, is equal to $r\sqrt{2}$, the chord of our "crescent" would be $15\sqrt{2}\cdot\sqrt{2}$, or 30. Hence it becomes manifest that the "crescent" of our problem actually is a square-segment, and that the rectangle the sides of which our mathematician computed in the operation just discussed had the chord as its longer side and, as its shorter side, half the chord or the altitude of the triangle standing upon the chord. Since, with $\pi = 3$, this rectangle had four times the area of the segment, the meaning of the *igi-gub-ba* ¼ mentioned in l. 6 of our problem as well as in l. 2 of the table-text YBC 7243 becomes manifest: The area of the square-segment could easily be found by dividing by four the area of the rectangle formed by the chord as the longer side and half the chord as the shorter side. This approximation was, of course, not without practical value. As crescents of silver, bronze, or precious stones were frequently worn as jewels or emblems of the Moon-god,[54] the *igi-gub-ba* formula provided the silver or coppersmith, who was entrusted with the manufacture of such ornaments, with an easy means of estimating the amount of material needed for a square-segment of given size.

We now turn to the second problem which, as was intimated above, p. 316, the author of our text applied himself to solve. As was pointed out before,[55] in this second operation the factor $s \cdot c$ of equation [13] was twice the "crescent"-area; hence

$$x^2 - 3/2 \cdot 5x = 3/2 \cdot 2 \cdot 112\tfrac{1}{2}$$
$$x = 15/4 \pm \sqrt{(15/4)^2 + 675/2}$$
$$x = 15/4 \pm 75/4$$
$$x = 22\tfrac{1}{2}.$$

Accordingly, the *šiddum* of the figure in question was $22\frac{1}{2}$, while its *pûtum*, being $\frac{2}{3}x - 5$, was equal to 10. Here again we must ask the question as to the relation of these two magnitudes to the dimensions of the "crescent." It will be noted that their sum is a good approximation of the arc of our segment, an approximation better than that obtained with $\pi = 3$. For the *šiddum* of $22\frac{1}{2}$ is ¾ of the length of the chord, while the *pûtum* is exactly ⅓ of the chord. Since, as was mentioned above (p. 317a), the chord of the square-segment is equal to $r\sqrt{2}$, the sum of the *šiddum* and the *pûtum* is, therefore, expressed by the equation

$$šiddum + pûtum = 3/4 \cdot r\sqrt{2} + 1/3 \cdot r\sqrt{2}$$
$$šiddum + pûtum = r\sqrt{2} \cdot 13/12, \text{ or } 1.532\, r.$$

The actual length of the arc of the square-segment

[54] See, e. g., the text from Drehem no. 22 published by Delaporte, *RA* VIII, 1911, pp. 197 f.; see further Scheil, *RA* XIV, 1917, p. 181, who cites from a vocabulary a passage mentioning a crescent of *dušû*-stone. Lunar crescents from bronze and silver found at Boğazköy are referred to by Sommer, *ZA* XLVI, 1940, p. 47.

[55] See especially p. 316, equation [15].

is $\frac{r\pi}{2}$, or $1.570\,r$. As with $\pi = 3$ the arc would be only $1.5\,r$, we notice here again that the Babylonians were fully aware of the mistakes caused in their geometrical calculations by this value, for otherwise it would have been unnecessary to elaborate a method of approximating the length of the arc. Our result makes it further probable that, in the diagram by which the ancient mathematician illustrated his calculation, the straight line which, slightly longer than the chord, is drawn underneath the "crescent" was meant to show the arc of the segment represented as a straight line.

(β). Segments of other Inscribed Polygons.

It is obvious that the *igi-gub-ba* 15′ and the other "crescent" formulae to be inferred from the problem-text MLC 1354 apply only to the square-segment, and that other formulae had to be worked out for the "crescents" formed by other equilateral polygons inscribed in a circle. It is, therefore, not surprising that, besides the constant 15′ discussed in the preceding pages, the table-texts YBC 5022 and YBC 7243 list altogether three other *igi-gub-ba*-values belonging to "crescents," namely 10′,[56] 4′20″,[57] and 45′.[58] If we assume that these three constants are to be interpreted in the same manner as the value 15′, or ¼, viz., that they represent the ratio of a certain polygon-segment to the area of the rectangle formed by its chord and half its chord, it is possible to determine to the segment of which polygon these magnitudes belong.

We begin our investigation with the largest of all possible segments, the semicircle which, according to problem C 1, ll. 8-10, of the text B.M. 85210,[59] was also termed *askaru,* "crescent," by the Babylonian mathematicians.[60] As regards the area of this "crescent," modern savants have repeatedly stated that the area of the full circle was taken to be equal to the twelfth part of the square of the circumference;[61] as the latter was reckoned at thrice the diameter, or six times the radius, the area of the circle was equaled to $3\,r^2$, and, accordingly, that of the semicircle to $3/2\,r^2$. Now in the case of the semicircle the rectangle formed by the chord and half the chord is, of course, equal to $2\,r \cdot r$, or $2\,r^2$; thus the ratio $\frac{\text{segment-area}}{\text{area chord} \cdot \text{half-chord}}$ is equal to $\frac{3}{2}r^2 \cdot \frac{1}{2\,r^2}$, or ¾, which fraction appears in sexagesimal writing as 45′. Hence there remains little doubt that the *igi-gub-ba* 45, listed in YBC 5022, l. 54 as belonging to a "crescent," refers to the semicircle which, according to Babylonian calculation, was assumed to cover ¾ of the area of the rectangle formed by the diameter as the longer and the radius as the shorter side.

As the inscribed hexagon furnished the ancient Semites their approximation of the circumference of the circle, we shall not fail in assuming that the characteristic qualities of this polygon were diligently studied and that, therefore, an *igi-gub-ba* relating to the hexagon-segment is contained in our lists. Computed by means of the Pythagorean Theorem which was well known to the Old

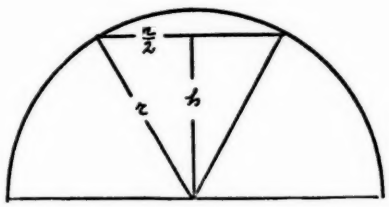


Fig. 4

Babylonian mathematicians,[62] the area of the hexagon-segment is expressed by the equation:

$$segm._6 = \frac{r^2\pi}{6} - \frac{r}{2} \cdot h$$

$$h = \frac{r}{2}\sqrt{3}$$

$$segm._6 = \frac{r^2\pi}{6} - \frac{r^2}{4}\sqrt{3}$$

$$segm._6 = \frac{r^2}{12}(2\pi - 3\sqrt{3}).$$

If, following the Babylonian practice, we reckon with $\pi = 3$ and $\sqrt{3} = 5/3$,[63] we obtain:

[56] YBC 5022, l. 21, and YBC 7243, l. 3; cf. above, note 30.

[57] YBC 5022, l. 52.

[58] YBC 5022, l. 54.

[59] The text was transliterated and translated by Thureau-Dangin, *Textes mathématiques,* pp. 46 ff.

[60] See also Thureau-Dangin, op. cit., p. 215, s. v. *askaru.*

[61] See, e. g., Thureau-Dangin, *RA* XXIX, 1932, pp. 27 f.

[62] Cf. below, p. 320.

[63] On this approximation see below, p. 319.

$$segm._6 \sim \frac{r^2}{12}(6-5)$$

$$segm._6 \sim \frac{r^2}{12}.$$

As regards the rectangle formed by the chord and half the chord, its area is, in the case of the hexagon-segment, equal to $r \cdot \frac{r}{2}$, or $\frac{r^2}{2}$, so that the ratio $\frac{\text{segment-area}}{\text{area chord} \cdot \text{half-chord}}$ is equal to $\frac{r^2}{12} \cdot \frac{2}{r^2}$, or $\frac{1}{6}$, which fraction appears, in sexagesimal writing, as 10′. Hence we come to the result that the *igi-gub-ba* 10 listed in the passages quoted above, note 56, belongs to the hexagon-segment.

As we notice that the *igi-gub-ba*-values decrease when the number of the sides of the inscribed polygon increases (so far we have assigned 45′ to the semicircle, 15′ to the square-segment, and 10′ to the hexagon-segment), we are led to the conclusion that the fourth *igi-gub-ba* recorded by our lists, viz., 4′20″, belongs to the "crescent" of a polygon with more than six sides. In fact, a calculation with modern formulae easily shows that this value applies fairly well to the segment cut off from the circle by the inscribed pentedecagon. However, it is inadmissible to assume that the Babylonians, reckoning with $\pi = 3$, were able to compute with any degree of accuracy the segment or the chord belonging to the inscribed pentedecagon; for already with the dodecagon, the segment of which is

$$segm._{12} = \frac{r^2}{12}(\pi - 3),$$

their formula fails since, with $\pi = 3$, the right-hand side of the equation, and thus the segment-area, becomes zero. Hence we must conclude that the *igi-gub-ba* 4′20″ represents so poor an approximation of the ratio $\frac{\text{segment-area}}{\text{area chord} \cdot \text{half-chord}}$ of a polygon between the hexagon and the dodecagon that it is impossible to determine which figure is meant. Perhaps some day a problem-text will come to light in which this constant is used in connection with given parameters revealing the nature of the relevant polygon.

The question might be asked as to why, while recording *igi-gub-ba*-values for the computation of the area of the semicircle, the square-segment, and the hexagon-segment, our table-texts fail to list a constant applicable to the "crescent" of the inscribed triangle. The answer to this question is perhaps contained in the problem no. 29 of the aforementioned text B.M. 85194,[64] where it is required to compute the area of a "crescent" of which the arc, $a = 60$, and the chord, $c = 50$, are given. The only figure where these parameters are approximately correct is the segment cut off by a regular triangle from a circle with the radius $r = 30$. For according to Babylonian calculation with $\pi = 3$, the arc of that segment, viz., $\frac{2r\pi}{3}$, would be equal to $\frac{2 \cdot 30 \cdot 3}{3}$, or 60. The chord, on the other hand, being equal to $r\sqrt{3}$, or about 51.96, could be rounded off to 50 provided that $\sqrt{3}$ was approximated by the fraction $\frac{5}{3}$ (or 1°40′ in sexagesimal writing.) Now the redactor of the problem computes the area of his triangle-segment by means of a rather bizarre formula which can be expressed as follows:

$$segm._3 \sim c \cdot (a - c) - \frac{(a-c)^2}{2},$$

in which a designates the arc and c the chord of the segment. His formula furnishes

$$segm._3 \sim 450,$$

or, since, as was mentioned before, the radius of his circle is $r = 30$,

$$segm._3 \sim \frac{r^2}{2}.$$

This result is well in line with the approximations $segm._2 \sim \frac{3r^2}{2}$,[65] $segm._4 \sim \frac{r^2}{4}$,[66] and $segm._6 \sim \frac{r^2}{12}$,[67] previously inferred from the *igi-gub-ba*-values 45′, 15′, and 10′; for all these formulae show the same tendency to oversimplification at the expense of precision which characterizes the treatment by the Babylonians of many problems involving circles. Be that as it may, the existence of the peculiar formula used in this problem for the computation of the area of the triangle-segment may account for the absence of a pertinent *igi-gub-ba* from our lists of constant reciprocals.

[64] See above, note 34, and p. 315.
[65] On this formula see above, p. 318.
[66] See above, p. 317.
[67] See above, p. 319a.

The foregoing brief remarks will suffice to show that the precious new material published by Neugebauer and Sachs raises numerous questions which the authors either did not touch or failed to answer.[68] Yet, it would be unfair to mention only problems which they did not solve when their volume contains a considerable number of instances in which they showed great ingenuity in the interpretation of the texts. Among these we mention in the first place their discussion of the interesting table-text Plimpton 322 (pp. 38 ff.) which lists 15 sets of Pythagorean numbers, i. e., numbers which fulfill the condition

$$a^2 + b^2 = c^2.$$[69]

In spite of the fragmentary state of preservation of the tablet, Neugebauer and Sachs recognized that these sets of numbers were not chosen and arranged at random but in such a way that the quotients $\frac{c^2}{b^2}$ (i. e. $\frac{5^2}{4^2}$ and $\frac{13^2}{12^2}$ in our examples above, note 69) form what amounts almost to an arithmetical progression. We further single out for praise the care with which the authors studied various texts relating to bricks, particularly YBC 4607 (pp. 91 ff.) the analysis of which provided an opportunity to list the different types of bricks according to their size and to point out which specific measures of volume were used in counting bricks.

The few examples which we selected for discussion from the wealth of material presented by Neugebauer and Sachs will convince the reader that the new texts represent a notable contribution not only to our knowledge of Babylonian mathematics but also to the understanding of such branches of Babylonian life in which questions relating to arithmetic and geometry were involved. The authors should, therefore, be warmly thanked for, and congratulated upon, the zeal and energy with which they gathered the unpublished material from various collections and improved upon earlier readings by collation and reconsideration of tablets published previously. Highest praise is also due to the American Oriental Society and the other learned institutions which contributed to the publication of the handsome volume.

[68] Some other aspects of the material contained in the new volume will be discussed by me elsewhere.

[69] Such numbers are, for example: $3^2 + 4^2 = 5^2$ or $5^2 + 12^2 = 13^2$.

BRIEF COMMUNICATIONS

The Tablet Collection of the University Museum [1]

There is little need to remind Orientalists of the significant role played by the tablet collection of the University Museum in the history of Assyriology and Sumerology. For well-nigh half a century it has been furnishing pertinent and in some ways unique source material for some two millennia of Sumero-Babylonian cultural history, from the Presargonid days of the third millennium B. C. to the Achaemenid days of the first millennium. It has helped to illuminate this Sumero-Babylonian culture in all its varied aspects: language and history, business and administration, religion and science, law and literature. And yet for one reason and another no overall picture of the size and nature of the tablet collection has as yet been made available to Orientalists. This paper will attempt to make up for this lack, if only, let it strongly stressed, to a very limited extent. The figures collected here are the result of a very brief preliminary survey, and must be taken as extremely rough approximations only. Nevertheless it is to be hoped that it will leave the reader with a much clearer perspective than he may have had hitherto of our tablet collection as a whole.

The tablet collection of the University Museum consists of approximately twenty thousand pieces of which perhaps some five thousand are such small fragments that many of them may ultimately prove of little practical value. These approximately twenty thousand tablets and fragments are divided into three groups in accordance with the manner in which they have been registered and numbered. The first group consisting of some ten thousand tablets and fragments, is registered as CBS, that is, Catalogue of the Babylonian Section.[2] Of these, some seven thousand are business and administrative documents (including letters), and they may be very roughly divided into periods as follows: Three hundred Presargonid and Sargonid; seven hundred Ur III, fifteen hundred Isin, Larsa, and Hammurabi Dynasties; twenty-eight hundred Kassite; one thousand Neo-Babylonian; seven hundred Achaemenid. Of the remaining three thousand tablets and fragments some nineteen hundred are lexical (including mathematical); nine hundred are literary; the remainder are of a mixed variety, such as incantations, omen, historical texts, etc.[3]

It is with the tablets of this CBS group of which about eight thousand were execavated at Nippur while about two thousand have been acquired through purchase, that cuneiformists are best acquainted, since almost all the University Museum tablets published to date come from this section. This is the group of tablets and fragments that has been examined and studied by a large number of scholars starting with Harper, Hilprecht, Clay, Radau, Poebel, etc. and ending with Chiera and Legrain. To date some thirty-five hundred tablets and fragments, that is a little over one third of this CBS group, have been published,[4] and while these consist primarily of the better preserved pieces, a considerable number of significant tablets and fragments, particularly in the field of Sumerian literature, still remain to be published. All the tablets and fragments of this section have been catalogued, primarily by Hilprecht and his assistants. But obviously enough this catalogue is very much out of date and stands in need of drastic revision.

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[1] This paper was read during the 1946 meeting of the American Oriental Society held in New York City.

[2] This section contains just over twenty thousand numbers, but about half of these numbers belongs to objects such as figurines, bricks, seals, vases, etc. Moreover the numbers belonging to the tablets do not follow consecutively from one up, but are interspersed throughout the section as a whole. If therefore a tablet is found listed in a publication as CBS 19798, for example, the conclusion must not be drawn that the nineteen thousand seven hundred and ninety seven numbers which precede it are all tablets; about half of these numbers belong to other objects.

[3] The great majority of the lexical and literary texts, it is to be noted, belong to the Isin-Larsa-Hammurabi period.

[4] For those published under the auspices of the University Museum, cf. now the excellent catalogue recently published by the University Museum under the title *Publications* (Philadelphia, 1945). For other publications, note particularly Radau in *HAV* 374-end; Chiera in *OIP* XI, XV, and XVI; Barton in *MBI*; Neugebauer and Sachs in *MCT* (cf. pp. 156-7 for list of mathematical tablets in the University Museum there treated).

The second group of our tablet collection consists of some twenty-eight hundred tablets and fragments which are registered under the initials UM, that is University Museum, under a system of numbering beginning with 29-13-1, where the first number stands for the year of registration, the second number, for the particular group of museum objects registered, and the third number, for the particular piece registered. The first part of this group of tablets and fragments is numbered consecutively from 29-13-1 to 29-13-999; the remainder is numbered consecutively from 29-15-1 to 29-16-797. All the pieces from this UM group were excavated in Nippur. According to their contents they may be divided very roughly as follows: About two thousand are business and administrative documents. Of these more than half belong to the Kassite period while about three hundred belong to the Ur III period, and another three hundred to the Isin-Larsa-Hammurabi period; not much more than a hundred belong to the Presargonid, Neo-Babylonian, and Archaemenid periods. The remainder of this UM group, some eight hundred in number, may be classified as lexical (some four hundred pieces), and miscellaneous. All these tablets, though registered and numbered, are still uncatalogued, and except for a number of mathematical texts published by Neugebauer and Sachs in their recent volume *Mathematical Cuneiform Texts*,[5] and two literary pieces published by the writer in the course of the past several years,[6] they are altogether unpublished. Needless to say, therefore, this group of close to three thousand pieces, holds considerable promise for future publication, although it should be stressed that it contains a very large number of tiny fragments which may ultimately prove of little practical value.

The third and last group in the University Museum tablet collection consists of some seven to eight thousand pieces which have only recently been put in order; there is very little of a definitive character, therefore, that can be said of them at the moment. All these pieces *of which several thousand are very tiny fragments* have been excavated at Nippur. As regards their contents they consist of the same categories as those of the first two groups, that is, the larger part are business and administrative documents ranging from Presargonid to Persian times; the rest are largely lexical and literary. Let me add, however, that to judge from the very first survey, probably more than five hundred pieces are inscribed with the Sumerian literary compositions, and while a good many of these are very small fragments, others are quite fair-sized. This new group of tablets and fragments will increase considerably the amount of unpublished Sumerian literary material in our museum which was estimated as approximately six hundred and seventy-five pieces in my *Sumerian Mythology*.[7] These tablets and fragments are now in the process of being numbered consecutively as N (that is, Nippur) 1 and up.[8]

As can be seen from preceding résumé, one of the urgent scientific needs of the tablet collection of the University Museum is that of cataloguing. About half the pieces, some ten thousand in number, are altogether uncatalogued, while even the catalogued half is in need of very considerable revision. It is the hope of all of us in the University Museum and in the University of Pennsylvania that means can be found to have this task achieved, at least in large part, in the course of the next several years; only those who have had actual experience in cataloguing tablets know what a difficult and time-consuming labor it is. If then things work out as planned it may be possible in the not too distant future to present to the scholarly world a much more detailed and much more accurate report of our museum's tablet collection, one that should prove of very practical use to Orientalists in general and cuneiformists in particular.[9]

SAMUEL NOAH KRAMER

UNIVERSITY MUSEUM, PHILADELPHIA

[5] Cf. p. 157 for the list beginning with CBS 29.13.21 and ending with CBS 29.16.589; all these numbers should actually be listed under the pattern UM x-y-z; thus, to take the first number CBS 29.13.21 as an example, it should read UM 29-13-21, cf. also *JAOS* 64.12, note 36.

[6] Cf. *BASOR* 94.2 ff.; *JAOS* 63.191 ff. See also Steele, *JAOS* 63.156.

[7] *Ibid.*, p. 24.

[8] For the sake of completeness let me add that the museum has a small number of tablets excavated at Billa (cf. Speiser, *Symbolae . . . Paulo Koschaker Dedicatae*, 141 ff.) and a small number of tablets excavated at Fara (cf. Kramer, *JAOS* 52.110 ff.). A large number of tablets from Ur is now in the process of division between the University Museum, the British Museum, and the Iraqi Directorate General of Antiquities.

[9] Since the reading of this paper, Dr. Francis R. Steele, newly appointed assistant curator in the Babylonian Section, has been devoting considerable time to the cataloguing task, with the aid of a grant from the American Philosophical Society.

The Byzantine Exhibition in Baltimore
The Coptic Section

In assembling the exhibition of Byzantine Art in Baltimore, the Walters Art Gallery accomplished a notable act of scholarship. The excellent catalogue makes it possible to survey rapidly the range of Byzantine art in American collections, and considering the improbability of major additions to existing collections of Byzantine material, it is improbable that the catalogue will be replaced for a long time. As this review deals only with the Coptic material in the exhibition, a very minor part of the whole, comment on the exhibition is necessarily restricted, but mention must be made of the subtlety and beauty of the installation. In certain sections of the exhibition it reached that high level of perfect installation where the visitor was almost totally unconscious that extensive pains had been taken to present the material in the simplest and most effective form possible. The installation of the jewelry and the coins in particular was an outstandingly successful solution to the problem of presenting small and difficult material.

In assembling this exhibition of Byzantine art, the Walters Art Gallery strove to present as complete a survey as American collections permitted, including the related and perhaps provincial field of Coptic art. As this subject had been covered by the Brooklyn exhibition in 1941, only those Coptic objects particularly important to a general survey or ones not included in the Brooklyn exhibit formed part of the exhibition. Thus the Baltimore exhibition did not pretend to cover the field.

An Egyptian origin is assigned to about a fifth of the extensive and important bronze section of the exhibition. Three bronze sculptures (Nos. 198, 200, 209) represent the final productions of classical art. Of these, the bronze panther, No. 198, from the Brooklyn collection, is probably of the IVth century rather than the IInd century, to which it was previously assigned, and the drunken Silenus, No. 209, from the Brummer collection, seems so very Hellenistic that it probably dates several centuries before the Vth-VIth century catalogue attribution.

The bulk of the Egyptian bronzes in the exhibition are vessels or objects for domestic or liturgical use, lamps and censers being by far the most numerous types represented. The selection of lamps gives a good survey of the range of types made in Egypt up to the Arab conquest, though American collections are lacking in the more spectacular and very imaginative examples which Coptic art produced. Of the censers of Egyptian origin, the earliest and finest are Nos. 271-273, the last one in particular being a beautiful example of Coptic bronzework of certain Egyptian origin. The earlier bronze censers, mostly of the Roman period and usually undecorated, are, quite wisely, not represented, for they have little more than archaeological interest. But a careful study of Egyptian censers with a classification of the types would be a very valuable contribution to many aspects of Early Christian studies. The older standard works contain many incorrect attributions and erroneous general statements on censers. Such a study would probably prove that some of these censers are far later than is now generally believed. Censer No. 274 may well be five hundred to a thousand years later than the date given in the catalogue. A qualitative analysis of the metal would perhaps be of aid in determining the date, for there is a chance that it is not bronze but brass. Much the same must be said of the seven censers, Nos. 277-282, each with a frieze of reliefs from the life of Christ, a type about which many articles have appeared during the last hundred years, with attributions ranging in place from Scandinavia to Armenia and in time from the fifth to the fifteenth centuries. While I cannot assign a certain date, it is at least clear to me, after some years of study, that these objects belong to a later archaizing period and are probably well after the tenth century. The dating of the Brooklyn censer, No. 281, as VIth-VIIth century, for which I am responsible, was assigned on inadequate basis.

The heavy bronze vase, No. 228, from the Brummer collection, is a common problem in Coptic art. Purchased in Cairo many years ago, it remains, so far as I know, without parallel among Egyptian bronzes; yet it is probably Egyptian—but how is certainty to be achieved? Similar problems arise over the small bronze crosses of which there are numerous examples in the exhibition. Most of these are benediction

crosses to be held in the hand of the priest when blessing the congregation in the Coptic and Eastern churches and are still in common use. Some included in the exhibition, particularly Nos. 284 and 285, suggest a relatively recent origin during the past few centuries. Probably very few of these crosses actually date to the early centuries of Christianity, though the well-attested custom in Eastern churches of copying early designs may preserve early types in these late examples.

It is still advisable to exercise great restraint in attributing undocumented bronzes to Egypt of the Early Christian era unless they are represented in documented collections, e. g., those in Cairo, the bulk of which were published by Strzygowski in his *Koptische Kunst.* In recent years these collections have been transferred from the Cairo Museum to the Coptic Museum in Old Cairo, where they have been installed under more favorable conditions. Another rich corpus of Egyptian material and one which has been little utilized by students of Early Christian art is the vast collection of objects recovered from the X-group burials in Nubia and in the Northern Sudan. The greatest single publication is Emery's,[1] which furnishes a wide range of weapons, bronzes, jewelry, gems, glass and similar objects now ascribed to the Vth-VIth century and apparently of Egyptian manufacture. Other excavations of X-group burials have yielded similar, if smaller, finds, but always of the same general type, thus making the Egyptian origin of the objects very probable. The small bronze handle, No. 317 of the catalogue, is almost exactly paralleled in the legs of several of the lamps found at Ballana and Qustul, which permits the date of this object to be shifted back approximately one century earlier than the attribution given in the catalogue. This is indeed a trivial point, but it serves as an example to show how useful the X-group material can be to Early Christian studies.

Not many of the ivory and bone carvings in this exhibition are assigned to the Coptic period. There is a wide selection of the conventional inlay panels, usually in bone, which have survived in great numbers from the late classical period, the Egyptian origin of which is clearly established. There are also several ivory pyxides, now generally assigned to the Alexandrian school, but all of these ivories are essentially the expression of late Roman art, however important some of their details may be as indication of the developing Christian style. Of purely Coptic ivories, i. e., ivories definitely identified as Egyptian of the Christian period, there are few. Indeed, there are very few in America, or anywhere for that matter, and it is well to remember there are remarkably few ivories which can be identified as Coptic with any degree of certainty. Of the ivories in this collection catalogued as Coptic, I am doubtful of the attributions of the following pieces:

No. 156, ivory panel from a book cover, Coptic, VIth-VIIth century.

Various attributions have been suggested for this piece, among which I think that of Capps (*Art Bulletin,* IX, 1927, p. 340), a Carolingian copy of an ancient ivory, the most probable. With the exception of one small fold of drapery on the book in the left hand of the Saviour, it would be difficult to find any of the details paralleled in Coptic art.

No. 157, convex ivory relief, Coptic, VIth-VIIth century.

If this object is of Egyptian origin, it is probably far later than the period mentioned. The richly embroidered clothing of Christ and the Virgin, the treatment of the Virgin's wimple, and the style of the faces, suggest a date in the early Middle Ages.

No. 158, horn plaque, Coptic, VIIth century.

Similar pieces are in the collection of the Coptic Museum in Cairo. While an exact date has never been assigned to them, it is clear from comparison with documented wood carvings that they must have been made after the Arab conquest. Tentatively they can be assigned as not earlier than the IXth-Xth century.

No. 162, three bone dolls, Coptic.

Numerous specimens of these figures have survived. At one time they were thought to be Coptic, but it is now clear, on the basis of specimens in the Arabic Museum in Cairo decorated with Cufic inscriptions, that they are probably Islamic rather than Coptic.

No. 170, two bone furniture ornaments, Egypt, IVth-Vth century.

It is difficult to believe that these fine figures

[1] The Royal Tombs of Ballana and Qustul, Cairo, 1938.

can be of Egyptian origin. The attenuated forms with their air of self-conscious delicacy suggest more the style of Italian and French reliefs of a later period than of Egypt. It seems more likely that these objects belong to a classical revival than to the last days of antiquity.

It is quite possible that the above exceptions are erroneous, but until documented Coptic ivories are available, it would be advisable to treat attributions of ivories to the early phases of Coptic art with great caution. The Coptic Museum in Cairo possesses almost nothing comparable to the items listed above, nor do the Coptic churches in Egypt have such objects. Numerous Egyptian sites have been excavated without yielding comparable specimens, while they have yielded large quantities of the inlay plaques. A fairly representative class of wood carvings, probably the closest parallel to ivories, has survived, and it seems probable that if such ivories had been made in Egypt during the Christian period some specimens would still be in the country or would have appeared in excavations. In my opinion there is as yet little basis for the attribution of most ivories to Egypt after the Vth to VIth century.

The first item in the catalogue is the magnificent red granite head of Caracalla from Koptos and now in the University Museum, Philadelphia. It is probably the finest piece of Egyptian sculpture of the period in America and would be outstanding as an example of portraiture in any period. It is clear evidence of the survival of large-scale sculptures in Egypt and has sometimes been referred to as the last of its kind. As John of Nikiou, writing in the VIIth century, refers to statues of the Byzantine emperors set up in his lifetime, there seems to be a good chance that large-scale sculptures continued to be made in Egypt until about the time of the Arab conquest. A few small sculptures complete the survey of late Roman times. It is not a period in which American collections are strong.

Only a few examples of Coptic sculpture are included in the exhibition. Of these sculptures, the most important are No. 47 and a small stone head of a woman from the Donnelly collection (not in the catalogue), both exhibited for the first time. The former, from the Mallon collection, is a beautiful example of Coptic sculpture and almost unique in its circular composition. Its similarity to the famous Ahnas school justifies the Vth century catalogue dating, but the iconography could as readily form the basis of a VIth century attribution. The subject, probably a female saint bound with ropes, hands behind her back, about to be torn apart by the attendant lion and panther, is handled in typical Coptic style as a handsome decoration with complete lack of depth. The three limestone stelae, Nos. 39-41, inclusive, from the excavations of the University of Michigan, are of considerable interest as documented and dated specimens of a type found in most large Egyptian collections and usually dated only as "late period." While clearly of pagan inspiration and of provincial origin, they are of interest as precursors of the developing Christian style.

Of the silver section, only a few pieces are catalogued as Coptic. The fragment of a silver dish, No. 372, from the Brummer collection, is almost certainly many centuries after the fifth century, to which the catalogue assigns it; and No. 375, a silver funerary urn, if Coptic, is without parallel. The silver flabella from the Brooklyn collection, though very probably following the earliest models and dated by Bréhier to the VIIIth or early IXth century, are more probably around the XIth-XIIth century. The jewelry section contains relatively few examples of Coptic jewelry, quite understandably, for little has survived.

In the introduction to the catalogue, Mr. Ross remarks that the attributions are those of the lenders, and it is for this reason that I have taken exception to some of the dates and attributions. The majority of American collections do not concentrate on Egyptian art, and so are inclined to rely on earlier attributions. This is particularly evident in another branch of the exhibition, the textile section, on which I do not feel qualified to pass judgment. Even in this section, there are exhibited a few pieces which must certainly date from the XVIIth or XVIIIth century, and I believe that many of the dates on the early textiles would be changed by the specialist. My criticism may well be due to an impression that recent interest in this country in Early Christian art has led frequently to attributions more interesting than sound. The great body of information which has been compiled both at Princeton and Dum-

barton Oaks should provide an adequate basis for research for any museum eager to classify its objects. By assembling this great body of material and making it available to critical comment, the Walters Art Gallery has made a great contribution to all American museums.

JOHN D. COONEY

THE BROOKLYN MUSEUM

The Canaanite Poem of the Gracious Gods, Line 12

This line reads as follows in the *editio princeps*:

šb'd yrḫm 'l 'd w'rbm t'nyn

and this reading has been accepted by all subsequent editors. In JAOS 66 (1946), 60 ff. I suggested that the meaning was "Seven times place the image of the moon on the tablestone(?)," and on the basis of that translation ventured some rather rash speculations concerning the nature of the rite involved. A reconsideration of the passage now leads me to propose that the correct reading is really

šb'd yrgm 'l 'gb w'rbm t'nyn

"(Then) shall be recited seven times to the accompaniment of the flute [Heb. *'ūgāb*] (the following refrain), and the votaries shall intone the response." The refrain in question is the immediately following *w(?)šd šd ilm* which is in fact repeated in line 28.

In support of this reading it should be observed that the *ḫ* of *yrḫm* is indeed in rasura and that the first editor himself seems now to prefer the reading *yrgm* (though without explaining the whole clause).[1] Moreover, the letters *gb* and *d* are distinguished in alphabetical cuneiform only by a single wedge at the base of the first vertical.

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[1] See *Syria* 1941: 2, n. 2.

Steindorff Bibliography: Further Addenda and Corrigenda

Since publication of the first set of additions to the Steindorff Bibliography in JAOS, vol. 67, No. 2, Apr.-June, 1947, all but two of the items below have been gratefully received from Dr. J. Simon in Rome. Page numbers at left refer to JAOS, vol. 66, No. 1, Jan.-Mar., 1946. The addition for p. 82 (1923) and the correction for p. 81 (1909) were kindly sent by Professor Bonnet at Bonn.

Addenda:

p. 77 (1887):
Review of J. H. Bondi, *Dem hebräisch-phönizischen Sprachzweige angehörige Lehnwörter in hieroglyphischen und hieratischen Texten*, Leipzig, 1886:: *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, vol. 41, 1887, pp. 743-745.

p. 78 (1894):
Heinrich Brugsch (Obituary):: *Daheim*, vol. 31, 1894, pp. 86-87.

p. 79 (1896):
Israel in einer altägyptischen Inschrift:: *Mittheilungen und Nachrichten der Deutschen Palaestina-Vereins*, Jhrg. 1896, pp. 45-46.

p. 79 (1897):
Review of Conrad Beyer, *Im Pharaonenland*, Leipzig, 1896:: *Literarisches Centralblatt*, Jhrg. 1897, col. 681.

p. 81 (1905):
Il doit avoir une lettre de Steindorff dans "Leipziger Neuste Nachrichten" de mai (?), 1905. Cf. *Orientalistische Literaturzeitung*, vol. 8, 1905, col. 306-307: "Über die Ausgrabungen an der Cheops — Pyramide entnehmen wir einem Briefe Steindorffs aus Kairo vom 15. v. Mts. nach den *Leipziger Neuesten Nachrichten*": . . .

Elephantine:: *Paulys Real-Encyslopädie der classischen Altertumswissenschalft*. Neue Bearbeitung. Unter Mitwirkung zahlreicher Fachgenossen herausgegeben von Georg Wissowa, 5. Band, Stuttgart, 1905, col. 2321-2324.

p. 81 (1910):
Review of E. A. Wallis Budge, *The Egyptian Sûdân*, 2 Vols., London, 1907:: *Literarisches Zentralblatt*, vol. 61, 1910, col. 305-306.

Review of *Hieratische Papyrus aus den Königlichen Museen zu Berlin*, hrsg. von der Generalverwaltung, Band I. II. III, 1. IV, Leipzig, 1896-1908: *Literarisches Zentralblatt*, vol. 61, 1910, col. 278-279.

p. 82 (1915):
Altägyptische Porträtplastik: *Velhagen & Klasings Monatshefte*, 29. Jhrg., 2. Band, 1915, pp. 474-487.

p. 82 (1923), third title:
Das Grab des Pharao Tutenchamun also appeared in *Deutsche Literaturzeitung*, vol. 44, 1923, pp. 141-152.

p. 84 (1930):
Koptische Grammatik mit Chrestomathie, Wörterverzeichnis und Literatur. Neudruck der zweiten Auflage mit Nachträgen. Berlin, 1930, XX, 247 p., 104 p. Added t.-p.: Porta Linguarum Orientalium, XIV.

Corrigenda:

p. 77 (1889):
Israel . . . vol. 16, 1889. *Lire*: 1896. Israel . . . vol. 16, 1896.

p. 78 (1890):
Die Keilschriftliche Wiedergabe . . . *Ajouter*: Heft 1, Leipzig, 1890, pp. 330-361.

p. 79 (1895):
Wie in Ägypten ausgegraben wird . . . circa 1895. *Lire*: 11. Jhrg., 1896-1897, 2. Band, pp. 58-63.

p. 80 (1899-1900):
Ein neu ausgegrabener ägyptischer Tempel . . . *Lire*: Ein religiöser Reformator im alten Ägypten . . .

p. 81 (1909), second title:
The printer has dropped out several lines and has elided two titles into one. The following is the correct reading:
Die aegyptischen Gaue und ihre politische Entwicklung:: Leipzig, Königlich Sächische Gesellschaft der Wissenschaften, Philologisch-Historische Klasse, Band 27, *Abhandlung* 25, pp. 863-897.
Das ägyptologische Institut: ***Festschrift zum 500 jährigen Jubiläum der Universität Leipzig,*** Leipzig, 1909, pp. 1-14 + 1 plan.

p. 86 (1938), line 12:
oriental. *Lire*: orientale.

p. 86 (1939):
Ludwig Borchardt . . . Est à placer sous l'année 1938.

JAMES HENRY BREASTED, JR.

LOS ANGELES COUNTY MUSEUM

Note on Chinese Libraries

I read with much interest the article on The Cultural Opportunity in China in your Journal, vol. 67, No. 2, by Professor L. C. Goodrich and particularly endorse his view on the bright outlook of education and research in China.

There is however one point on which some clarification seems necessary. The library attached to the so-called Institute for the Study of Humanities in China in Peiping, which was sponsored and controlled by the Japanese for nearly twenty years, was never intended to be a library of research for the learned public. The library building referred to by Professor Goodrich consisted purely of stacks for housing the books and was without any working space for using the books. The purpose of the Japanese administration was to compile a bibliography so as to extend the *Ssŭ-k'u ch'üan-shu t'i-yao* (of the Ch'ien-lung era) to the present date.

The books collected for the library were for the exclusive use of the collaborators for that project, consisting of a few Japanese and a few tens of Chinese workers. The organization of the institute deteriorated rapidly after the opening of hostilities in 1937, and after Pearl Harbor, the Japanese keeper Mr. Hashikawa received nothing from his government for the maintenance of the institute. It was kept going after a fashion by selling furniture and catalogues and by private subscription. Consequently, no upkeep or repair of the building was done for several years. Moreover, the Japanese built numerous dugouts in every garden and courtyard, large or small, for air-raid shelters.

When Academia Sinica received the building and the books from the Ministry of Education in the summer of 1946, they were found to be in a state of indescribable confusion, with leaking roofs, broken windows, and debris everywhere. Before the library can be reconverted—or rather converted—to effective and orderly use by scholars, it will be necessary to do at least the following things: (1) Repairing of the buildings and the cleaning of the courtyards of debris and (2) arranging of research desks and reading rooms. All this will of course need much labor and resources.

The work of conversion was started in the autumn of 1946 and is expected to be completed this autumn, when the library will be opened for the use of research workers. An additional difficulty about the use of the books lies in the fact that the Japanese had only a bound catalogue but neither a shelf catalogue nor any markings on the books to indicate their classification or location. Consequently it takes an enormous amount of time to find any specified book—a problem which never arose for the original project. To correct this difficulty a force of about twenty men have been

employed to compile a shelf catalogue and mark the books to make the finding of books a practical undertaking. Finally, the lack of a system of heating—which was no problem when the books were taken out by the cataloguers under the Japanese project—has proved to be a very hard problem under present conditions. This caused considerable delay in the coldest part of last winter, when it was not possible for workers to stay in the building for extended hours.

In concluding this note, I wish to say that it is far from the minds of those in Academia Sinica to wish to limit the usefulness of the library in any way. On the contrary, all efforts have been made to hasten the day when this valuable collection will be made available for the maximum use by the greatest number of serious students, irrespective of institution or nationality.

FU SSU-NIEN

INSTITUTE OF HISTORY AND PHILOLOGY,
ACADEMIA SINICA

REVIEWS OF BOOKS

The United States and the Near East. By E. A. Speiser. Pp. xvi + 263. The American Foreign Policy Library. Cambridge, Mass.: *Harvard University Press,* 1947. $2.50.

Because, notwithstanding its professed political purpose, *The United States and the Near East* is also, and perhaps essentially, a book on and of history, a review of it may not be out of place in this periodical, in which politics, if ever dealt with, is considered *sub specie aeternitatis.*

Had Professor Speiser never been directly acquainted with the Near East and had he not acquired a thorough knowledge of its contemporary issues while serving during the war in the Near East division of the Office of Strategic Services (see p. xiv), his book, if it had ever been written, would be perhaps less sound than it actually is. But it certainly would be much less sound, or rather it would not be what it actually is, namely one of the best informed, most reliable, and most penetrating studies ever made on the subject, if its author, as an outstanding scholar of the ancient Near East, had not possessed, in a high degree, the deep insight of a born historian. His discussion of the present day problems of the Arab world is far more illuminating than all that which has been written to date by authoritative and authorized "experts," be they native or foreign, not because they were less well informed about current affairs than Speiser was but simply because they lacked the methodical approach, the wide outlook, and the sense of measure and proportion which are the result of a long familiarity with a millenarian past. History, as Wellhausen once said of philology, may be disregarded but in the long run takes its revenge.

To be sure, none of the many books dealing with the political situation in the Near East fails to appeal to history. However, a few general statements about "the immovable East" or "the continuity of Eastern civilization" do not make up for a correct understanding, substantiated by first hand research, of what those terms actually mean. Speiser has succeeded in making this point clear in little more than thirty-five pages. The Near East, which corresponds approximately to the area where Arabic is spoken minus North Africa west of Egypt (and although one feels tempted to argue against the splitting up of the Arab world there are good reasons for accepting it, at least for the sake of simplification), is really "One World" geographically as well as historically. The differences between its sundry regions are anything but irrelevant but do not overshadow its substantial unity. It is the center where the most ancient civilization developed and whence the essential elements of our own social and cultural life spread over a wider area. Through five millennia of "a composite history . . . made up of countless component histories," "in no instance is there a complete break between two successive periods, since the underlying continuity remains intact throughout," and even in Islam, in spite of its revolutionary appearance, "older native forces reassert themselves" (p. 25-6).

It is no easy task to ascertain how far this unity and continuity is preserved in the contemporary Arab nations which after having been kept together as passive subjects under the domination of the Ottoman Empire were split asunder after the first World War and are striving for a new kind of unification after the second. Nor can we predict how and when this unification will take place. In these days history proceeds at full speed, and the diversity of economic resources, social and political developments, and actual needs and interests which now exists between the members of the Arab League may be composed under the impact of some unpredictable factor. Who could have foreseen, thirty years ago, that *Arabia Deserta,* this stepchild of nature, would undergo the greatest change in all its history and become something even better than "a land of milk and honey" because of the discovery of its oil resources?

Only through a deep intimacy with his subject and a long rumination over it could Speiser succeed in giving, within the range of his little book, so much factual information and so full a discussion of the issues involved. That the information,

as far as this reviewer is able to check on it, is entirely reliable, hardly needs to be stressed; as for the discussion, it is remarkable for its objectivity, candor, and absolute outspokenness. Criticism, even of the sharpest kind, is freely exercised towards Eastern and Western nations, not excepting the United States.

Speiser is well aware that history repeats itself, but at variance. His knowledge of the past does not dull his sensibility to the present, nor does he look at the contemporary Arab world in the same vein as Epicurus' gods. In fact, he is deeply concerned with its future and with the vital interests and the heavy responsibilities of the United States in regard to the progress, prosperity, and peacefulness of the Near East. Sympathetic as he is to the efforts of the young Arab states to attain complete independence from the more progressed Western powers, he refrains however from lulling them into self-complacency by overlooking their shortcomings. Although his criticism of their social backwardness, their inadequate education, and their political immaturity may sound to well-minded, if not thoroughly informed friends of the Arabs, it generally hits the mark. "Superficiality has become the curse of the modern Near East . . . instead of a meaningful blending of native and imported elements, we find . . . an incongruous association of the two, which often leads to serious collisions between them" (p. 142). This is a stern judgment, indeed, which however matches the judgment pronounced by another authoritative scholar who tackles the same problem from a quite different angle (H. A. R. Gibb, in the book reviewed below). Against this judgment one may argue, however, that if full independence should be given only to those nations which deserve it, very few indeed would enjoy its blessings. Nor should we forget that if in the past the "Christian" world as a whole (with the exception of Czarist Russia) could be presented as a model of a peaceful and harmonious development of prosperity through freedom to be imitated by the East, the same does not hold true since August 2, 1914.

If Speiser's reserve in appreciating the maturity level of the Arab world is likely to shock many, his attitude towards the Zionist issue will undoubtedly shock many more. However, this reviewer makes bold to affirm that, from his given viewpoint, Speiser's conclusion is incontrovertible: neither an all-Jewish, nor an all-Arab, nor an all-British domination would do justice to the historical precedents and the political implications of the problem.

An ancient Arabian poet, known as al-Mufaḍḍal al-Nukrī, described a fight which had occurred between his and a rival tribe, and impartially related the heavy losses on both sides. His poem became famous, and continued to be quoted centuries after under the title of *al-Munṣifa,* i. e. "The one which gives everybody his due." This reviewer submits that in a second edition this word be introduced as a subtitle of Speiser's book.

G. Levi Della Vida

Øst og Vest, Afhandlinger tilegnede Prof. Dr. phil. Arthur Christensen. København: *Munksgaard,* 1945, 224 p.

This volume of articles, dedicated to the late professor of Iranian languages at Copenhagen by Scandinavian orientalists and specialists in folklore, is unfortunately entirely in Danish, Norwegian and Swedish. While the book is thus limited in its' circulation the contents will be of interest to scholars everywhere. The titles of all the articles will be mentioned, but only those of special interest to orientalists are briefly summarized.

S. Dahl, The oriental mss. collection of the royal (Danish) library, highpoints in its' history, and cataloguing, 21-43. The librarian describes the long and distinguished tradition of oriental scholarship in Denmark in this article. The library is especially rich in Avestan and Middle Persian mss. brought from India by the pioneer orientalists Rask and Westergaard in the first half of the last century. Many Pali and Sanskrit mss. also form a notable collection, the former of which are of great use in the writing of the Pali dictionary.[1] The Far East is represented in a

[1] *A Critical Pāli Dictionary,* vol. 1, part 1, Copenhagen, 1924, and ff.

small collection of Tibetan and Mongol mss., most of them secured by Kurt Wolff in 1918. The plan of editing some of the rare mss. of Copenhagen has been carried out in a praiseworthy manner, thus making them available to scholars everywhere.[2]

Sten Konow, An Indoeuropean language in ancient East Turkestan, 44-9, is concerned with the designation problem of the *two indigenous* languages of Chinese Turkestan, so-called Tokharian and Khotanese-Saka. (Sogdian, Middle Persian and Turkish were presumably all introduced from the outside by traders, missionaries or colonists.) Prof Konow gives a clear summary of the designation problem, and a brief condensation may be of value.

In the northern oases of Chinese Turkestan a non-Iranian Indoeuropean language was in use, which, as H. Pedersen has shown, is related to Celtic. In it one finds a peculiar phonetic variation, for all of the IE voiced consonants become unvoiced. In the south an Iranian tongue was current.[3] Leumann first recognized the Iranian nature of the language and called it "Nordarisch." Kirste (WZKM 26, 1912, 395) gave it the name "Khotanisch," since the ms. fragments came from the Khotan region. This name was confirmed when the indigenous appelation *hvatanaa* "Khotanese" was found in one of the Berlin fragments. Then Lüders showed the relationship of this language with some Saka inscriptions in India (SPAW, Hist. Phil. Klasse 1913, 406; 1919, 734). So the name Saka was adopted by some scholars. All of the mss. in this language had been found in the southern oases until a ms. was found in Maralbaši, in a dialect of this language, but written in *cursive Brahmi* script like the non-Iranian IE language of the northern oases (so-called Tokharian).[4] In this dialect new characters were provided for the voiced consonants, lacking in the other language. This indicated that the geographical division of the languages into northern oases: non-Iranian IE, and southern oases: Khotanese-Saka, was oversimplifying the problem.

The IE language in the north was first *provisionally* called "Tocharisch" by Sieg and Siegling, the scholars who deciphered it. This designation, it seemed, was confirmed by the publication of a Uighur Turkish ms. of a Buddhist work (Maitrisimit)[5] which said, in a colophon, that it had been translated from Indian into *twχrï*, then into Turkish. This was not accepted as proof by many scholars that the IE language was this *twχrï*, and a dispute arose. It is not the place here to discuss the extensive literature on the subject. Suffice it to say that prof. Konow concludes that the words in the Uighur Maitrisimit, which were transliterated (or derived) from the *twχrï* language, were derived from an Iranian language, and more precisely from the new Maralbaši dialect of Khotanese-Saka. So *twχrï* (Tokharian) is really the Iranian Khotanese-Saka language according to Konow.[6]

What then is the non-Iranian IE language to be called? Sieg found that a local name was used for the language, viz. *ārśi*.[7] This, too, raised much speculation and comment. Prof. Konow does not seek to solve the designation problem of *ārśi*, but supposes the word to be an adaptation of Khotanese-Saka *ārśi* or *ārźi*, Skrt. *ārya*.[8]

Georg Morgenstierne, Khushhāl Khān, an Afghan national poet, 50-61. The author gives a brief resumé of early Pushtu literature before embarking on the main topic. During the war there was brought to Kabul a Pushtu ms., which gives the biographies and samples of poetry of Pushtu poets, some as early as the eleventh century![9] On linguistic, as well as other, grounds this is doubtful. While the earliest Pushtu work might be dated as early as the 15th century, it is only at the beginning of the 17th that Pushtu

[2] *Codices Avestici et Pahlavici Bibliothecae Universitatis Hafniensis*, and the *Monumenta Linguarum Asiae Maioris*, which reproduces mss. from all sources relating to the subject.

[3] For a bibliography of published ms. fragments and relevant publications cf. Dresden, M. J., Iranica, Introductio ad Linguam Hvatanicam, Jaarbericht no. 9, van het Vooraziatisch-Egyptisch Gezelschap *Ex Oriente Lux*, Leiden, 1944, 200-6 (in Dutch).

[4] Konow, Ein neuer Saka-Dialekt, *SPAW*, 1935, 772 ff.

[5] *SPAW*, 1907, 959-60; 1916, 414.

[6] Some scholars think the designation "Tocharian" should be eliminated altogether. In regard to *twχrï*, *twγr* and allied forms cf. W. B. Henning, Argi and the "Tocharians," *BSOS*, IX, 1938, 545 ff.

[7] E. Sieg, Ein einheimischer Name für *Toχrï*, *SPAW*, 1918, 565.

[8] Prof. H. W. Bailey gave a talk to the Linguistic Society in April 1947 on this subject, which will probably be published soon.

[9] A. H. Habibi, *Pata Khazana*, un texte inédit de Pachto, par Mohammed Hotak, Kabul, 1944 (in Pushtu).

poetry comes to the fore. Kushhāl Khān, one of the most prolific of these early poets, was born in 1613. He was chief of his tribe and served under the great Mogul Shāh Jahān, but was imprisoned by Aurangzeb for a time. He died in his 78th year. His dīwān not only reveals him as a fierce warrior, but also capable of writing subtle mystical and love poetry in his native idiom. Selections from his poetry are translated and discussed.

H. S. Nyberg, The Hājjīābād Inscription, 62-74. A new transliteration and translation of the Arsacid and Sassanian (*pahlavīk* and *pārsīk*) Middle Persian inscription of Shāpūr (241-72) are given. The author first gives an exhaustive survey of scholarly literature on the subject. The first word of the Arsacid version is restored as *wt'wny* (*vitāvanē*) < *vitāvan* "execution of a shot," while the Sassanian version has *tgl'hy* (tiγrāhē), with the same meaning < *tiγr*, NP *tīr*, "arrow," and *āh* the verbal noun of *ās-* "to hit, meet." So the opening translation is, "(This is) the arrow shot of me, Shāpūr, etc." The rest of the article discusses the interpretation of the inscription. The king went out to archery practice with his followers on a holiday, probably in *Tīr māh*. The author speculates on the significance of such an event comparing it with the Swiss story of Wilhelm Tell, the Swedish Stenkil, and others. It might be a survival of some pre-Aryan ceremony in Iran, or have some symbolistic significance.

Johs. Pedersen, Poets as court diplomats, 75-83. This article is concerned with the Persian musician and poet Bārbad, at the court of Khusraw Parwiz. It relates incidents showing the influence which Bārbad had on the king. The sources for these anecdotes are the Arabic histories and literary collections. The author shows the persistence of the tradition of the influence of poets on their patrons in Islamic times, and the rich rewards they obtained. An anecdote, in which a poet saved the day for Yaḥyā ibn Khālid, wazīr of Hārūn al-Rashīd, by relating the breaking of peace by the Byzantine emperor in a poem, is translated by the author.

H. Andersen, The Sassanian tradition in Firdausī's *Shāh Nāme*, 84-93, traces the Sassanian titles and ranks, as found in three Pehlevi books, into the *Shāh Nāme*. The three books are the *Ayātkār-i-Zarērān*, *Kārnāmak-i-Artaxšēr-i-Pāpakān* and the *Mātiyān-i-čātrang*. He analyzes the words in Pehlevi and in Firdausī's new Persian, and comes to the conclusion that Firdausī took them from an Arabic translation of the Pehlevi, and not from a new Persian translation of the Pehlevi *X^{v}atāi-nāmak* made in the 10th century, as Nöldeke proposed.[10]

K. Grønbech, Chinggis Khans' conquest of Persia, after the Mongol sources, 94-104. The author translates several sections of the "Secret History" *Yüan Ch'ao Pi Shih*, and a few short passages, with transliteration, from the *Altan Tobči* "Gold Chronicle," 1604, Saγan Sečen 1662, and a Copenhagen ms. *Köke debter* "Blue Book." It is good to see a scholarly system of transliteration of Mongol after so much variation, and unscholarly systems. From the Mongol material the author concludes that the Persian expedition was a profitable lark for the Mongols, who garnered much plunder, while for the Persians it was a catastrophe never to be forgotten.

C. G. Feilberg, Qanāts, Iran's subterranean irrigation canals, 105-113. A few pages are devoted to the importance, cost and work required in building and maintaining the life-giving canals in Iran. In West Turkestan they are called *kārīz*, and Persians are usually brought into the country to supervise the work. The author then shows the geographical extent of this system of irrigation from Chinese Turkestan to Morocco, where they are called *foggara* < Ar. *fuqra*. In Central Arabia they are called "kharaz" and "saqi." The author mentions the existence of such tunnels among the Incas of Peru. The final pages are devoted to Classical notices of such canals, esp. Polybius. They were probably used on Samos as early as the 6th century B. C., and the Etruscans also made use of them.

P. Tuxen, The correspondences of beauty spots, Somadeva-Cansanova-Lavater, 114-7. This article traces the belief that birth marks and other signs on the face are repeated in corresponding parts of the body. The first story about them is from the *Kathā-sarit-sāgara*, and the same belief occurs in the works of various European authors.

O. E. Ravn, Appeals to the Divinity in Babylonian hymns and prayers, 118-29. Translations of two Babylonian cylinder seals in the Danish National Museum, found by H. Ingholt in Hama,

[10] T. Nöldeke, *Das iranische Nationalepos*, 2 Aufl., 1920, 16 ff.

Syria, are presented. One is consecrated to the temple of "Eanna's wife."

K. Barr, Principia Zarathustriaca, 130-9, discusses the pre-Zoroastrian concepts of the *spənta* and *Aša*. The importance of the latter is stressed as Zarathustra regarded Ahura Mazdā as Aša's father, and was a fervent supporter of Aša. This does not mean that Ahura Mazdā played an unimportant role. Nyberg's conception of the pre-Zoroastrian Ahura Mazdā as a *deus otiosus* is criticized. The article brings in Indian evidence in presenting the complex picture of the pre-Zoroastrian religion of Iran.

C. W. v. Sydow, Some observations on the study of legends and philology, 140-66. This article is primarily concerned with the history of research in the subject, emphasizing especially the work of the Grimm brothers, Joseph Bédier, and Kaarle Kronn, a Finnish scholar in comparative literature who deserves to be better known.

L. L. Hammerich, The Hungarian knight in the Irish purgatory, 167-80. This deals with old Irish and IE eschatological ideas, especially visions.

Ad. Stender-Petersen, Ørvarod and Emperor Michael the third of Byzantium, 181-91, is concerned with the science (Algebra) of folklore, especially applied to the story of a Varangian Ørvarod and emperor Michael (842-67).

I. M. Boberg, Traditions of riddles in the east and west, 192-207, begins with the story in the Pehlevi *Yvišt-i-Fryān* and traces variations in European languages.

G. Knudsen, Witches in the Vemmelev church, 208-212, is concerned with a Scandinavian folk tale.

H. Ellekilde, Santa Claus (Julegubben) in Vinten, 213-224. This is a folk-tale about a Christmas elf (Swedish—*tomte*) in a village.

RICHARD N. FRYE

HARVARD UNIVERSITY

Report of the Interdepartmental Commission of Enquiry on Oriental, Slavonic, East European and African Studies, Foreign Office, HMS STATIONERY OFFICE, London, 1947, 192 pp.

During the war Great Britain, like our own country, felt the lack of specialists for the languages, cultures and peoples of non-European countries. The realization of this lack has not vanished with the end of the war. This report is the result of the investigations of a parliamentary committee under the chairmanship of the Earl of Scarbrough.

It was in December 1944 that Anthony Eden, then Secretary of State for Foreign Affairs appointed a group of people "to examine the facilities offered by universities and other educational institutions in Great Britain for the study of Oriental, Slavonic, East European and African languages and culture, to consider what advantage is being taken of these facilities and to formulate recommendations for their improvement." The words of the report itself speak best in recording the general conclusion. "The Commission has gone into this question with an open mind and has unanimously reached the conclusion that the existing provision for these studies is unworthy of our country and people. For reasons which we give, we consider that the study of the civilisations and languages of these countries is of such great importance for this and for succeeding generations that it would be harmful to the national interest to allow the present state of affairs to continue or even to deteriorate." Yet the record of accomplishments of British orientalists is one to be envied.

The present position of Oriental, East European and African Studies in Britain is analyzed and deficiencies are brought out. Likewise the national importance of these studies for Britain, which is no less true for the United States, is emphasized. "Though the direct influence learning can exercise on political relations is not great nevertheless a nation which does not possess a sound foundation of scholarship is ill-equipped to deal with world affairs, for scholarship is the source from which a knowledge of other countries and an interest in their ways of living is spread among the people. At a time when great efforts are being undertaken to make co-operation between the nations the basis of world peace and future prosperity this founda-

tion of scholarship has an importance which cannot be disregarded without injury to the national, and to international interest."

The importance of an academic tradition for our own universities is stressed by chapter four of the report. "The establishment and maintenance of an academic tradition is the first and most important long-term objective and it is only by calling into existence a body of scholars of high intellectual attainments that it will be possible to provide sound facilities for training for careers and to satisfy public interest. . . . This requires a continuous high standard over several generations." The universities of America would do well to heed these lines.

Chapter five of the report indicates the practical uses to which a training in Oriental Studies could be put. The systematic investigation of the needs of government, trade, industry, finance, as well as missionaries, public corporations (such as the BBC, BOAC, and the like), presents a strong case for the necessity of enlarging Oriental Studies in the UK. Needless to say, with the growing American interest and stake in the Orient, the importance of having well-trained and informed people to represent the USA is not to be minimized.

The development of public interest in the Orient is another subject studied by the commission. Methods for improving the teaching of information about the East in the schools of Britain are also considered.

It is impossible to do more than mention the subjects discussed in the report. A large section of it is a detailed regional survey discussing the present situation, the demand, findings and recommendations for each area. The recommendations made by the commission are concise and practical. With the recommendations of this report as a guide, the future of Oriental Studies, African and East European Studies in Great Britain seems bright. The report is both a challenge to and a model for Oriental Studies in America.

RICHARD N. FRYE

HARVARD UNIVERSITY.

Arabic Reader. By CHAIM RABIN. London: LUND HUMPHRIES, 1947. Pp. viii + 174.

Students and teachers of modern written Arabic will have abundant reason to be grateful to Dr. Rabin for his work in compiling this reader. Suitable practice materials and glossaries are still not easily or cheaply procured.

Dr. Rabin assumes only a rudimentary knowledge of Arabic, so the *Reader* can be effectively used at a fairly early stage of study. Thirty prose selections (including some 50 proverbs) were taken from modern authors, many of whom are Egyptian and are still alive. The passages average three short paragraphs in length and are arranged in order of difficulty—not an easy task, and one that has been performed with unusual skill. The meaning of every word is given together with its full vocalization alongside or on the bottom of the page on which it occurs. This is done for each selection, except for a few of the commonest words, so that a glossary is naturally not needed. A copious set of notes, consisting either of translations of phrases or comments on the grammatical constructions, afford a large measure of help.

By his fundamental conception of the manual, selection and gradation of texts, and notes, Dr. Rabin has showed himself to possess a high order of pedagogical ability. Self-teaching students will not find anywhere a more useful first reader for the modern language after they have gained some acquaintance with the basic morphology and syntax, for besides its many intrinsic merits, the *Arabic Reader* further commends itself by its large and clear type, uncrowded pages, and freedom from typographical errors.

If anything, Rabin has made things too easy for the student. Many of the passages almost automatically translate themselves from the vocabulary and notes. Beginners will have to be cautioned, therefore, against permitting themselves to develop more than a modest self-confidence as they proceed through the *Reader*. Otherwise, the certain disillusionment that will afflict most of them when they come into contact with non-textbook materials may prove fatal to their further interest and progress in Arabic. It is not that

the selections included in the *Reader* are all really easy, it is only that Rabin's aids—*ad hoc* meanings of words, numerous translations in the notes, etc.—make them seem so. However, this disadvantage is largely compensated for by the fact that since students will be virtually free from the burden of working out the translation, they will be able to devote most of their time to the subject matter and style.

The reviewer has only one major regret, namely, that the book is too short and does not contain enough specimens of "practical" Arabic. Most of the present and, I dare say, future students of Arabic are or will be interested almost exclusively in newspapers, treaties and official documents, books and articles dealing with Near Eastern economics, politics, etc. for government and private research purposes, and not in essays and other types of pure literature, which constitute the bulk of the *Arabic Reader*. For this reason, the inclusion of a relatively large number of proverbs at the expense of more useful text is of questionable value. Since they are classical in structure and vocabulary and, moreover, are accompanied by a translation, they afford no language practice; nor can they by themselves provide a significant insight into the Arab mentality.

The reviewer seriously doubts that any elementary student would be able, as Dr. Rabin claims, "after having studied this book . . . to read with enjoyment the original works of these and other authors, as well as newspapers and official documents." To be able to read modern Arabic "with enjoyment" or even general comprehension—even if it is easier than the classical language—requires a considerable amount of practice and familiarity with numerous constructions and idioms, to say nothing of an ample vocabulary. This practice, I submit, should be made on the appropriate materials. Reading Arabic may require only "command of a few common constructions and turns of phrase . . . and vocabulary," but, unfortunately, of the 20 years alleged to be necessary for acquiring a mastery of the language (and with considerable truth, as far as this reviewer is concerned), the last 19 of them are largely occupied with acquiring the turns of phrase and vocabulary. Therefore, those students who do not aspire to be Arabists, but who are or will be historians, political scientists, economists, engineers, etc. should concentrate as soon as possible on the vocabulary, idioms, and style of the materials that they will eventually be called upon to handle. These, in most cases, will not be the writings of such eminent authors as Ṭāhā Ḥusayn, Tawfīq al-Ḥakīm, *et al.*, but of the journalists, treaty writers, and professors in the various universities of the Near East, whose productions, steadily mounting in volume and quality, warrant the attention of Western students.

SIDNEY GLAZER

LIBRARY OF CONGRESS

Acalagaḍha: part 3 of Ābū. By MUNIRĀJ ŚRĪ JAYANTAVIJAYAJI. Pp. 100 + 16 plates. Bhavnagar: YAŚOVIJAYA JAINA GRANTHAMĀLĀ, 1945.

Hammīragaḍha. By MUNIRĀJ ŚRĪ JAYANTAVIJAYAJI. Pp. 14 + 54 + 4 plates. Bhavnagar: YAŚOVIJAYA JAINA GRANTHAMĀLĀ, 1945.

For some years the learned Jain monk, Śāntamūrti Munirāj Śrī Jayantavijayaji has been writing a number of books on Jain sacred places. The Acalagaḍha is the third volume of a detailed study of the sacred places of the Mt. Ābū district. The other volume is a smaller study of the ancient tīrtha, Hammīragaḍha. The Jains are fortunate in that their laymen support and publish scholarly works. There is a great deal of scholarly activity now among the Jains, and other Indians as well, that is little known to American Indologists. Unfortunately for Americans, many valuable works are in vernaculars which are read by few Americans: e. g. these two volumes are in Gujarātī. They are intended primarily, of course, for the Gujaratis themselves, but will well repay study by any one interested in Jain literature or Western Indian archaeology.

HELEN M. JOHNSON

AMERICAN ORIENTAL SOCIETY

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The list is corrected to October 29, 1947 according to the latest and best information available to the Secretary. Members are requested to inform the Secretary of any corrections that should be made. The number placed after the address indicates the year of election.

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Prof. STEN KONOW, Ph. D., Kirkevejen 114 C, Oslo, Norway. 1937.

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Hon. Henry Morgenthau, 1133 Fifth Ave., New York City, New York. 1921.

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Rev. R. PIERCE BEAVER, Ph. D., The Theological Seminary of the Evangelical and Reformed Church, Lancaster, Pa. 1938.

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Dr. GUSTAV VON GRÜNEBAUM, Room 214, Oriental Institute, University of Chicago, Chicago, Ill. 1939.

Rev. G. H. GUYOT, C. M., S. T. L., S. S. B., Kendrick Seminary, 7800 Kendrick Road, St. Louis 19, Mo. 1941.

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Mary R. HAAS, Ph. D., Dept. of Oriental Languages, University of California, Berkeley 4, Calif. 1942.

WILLIAM S. HAAS, Ph. D., 19 E. 86th St., New York 28, N. Y. 1947.

Prof. E. ADELAIDE HAHN, Ph. D., (Hunter College), 640 Riverside Drive, New York 31, N. Y. 1934.

Mr. ALFRED HALDAR, Svartbacksgatan 1B, Uppsala, Sweden. 1947.

Mr. MASON E. HALE, Jr., 573 Yale Station, New Haven, Conn. 1946.

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Prof. ROBERT A. HALL, Jr., Litt. D. (Cornell Univ.), 308 Cayuga Heights Road, Ithaca, N. Y. 1937.

Dr. RICHARD T. HALLOCK, Oriental Institute, University of Chicago, Chicago 37, Ill. 1932.

Prof. CLARENCE H. HAMILTON, Ph. D., 290 Elm St., Oberlin Ohio. 1926.

ROBERT ALEXANDER HAMILTON, M. A., 444 Brennan Ave., Ottawa, Ont., Canada. 1945 (1940).

Rev. EMANUEL W. HAMMER, Veterans' Hospital, Northport, N. Y. 1939.

Rev. ROBERT E. HANSEN, 509 Woodlawn Road, Baltimore 10, Md. 1947.

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Prof. DOUGLAS G. HARING, 304 Maxwell Hall, Syracuse University, Syracuse 10, N. Y. 1937.

Prof. FRANKLIN S. HARRIS, Jr., Dept. of Physics, University of Utah, Salt Lake City 1, Utah. 1945.

Pres. FRANKLIN STEWART HARRIS, Brigham Young University, Provo, Utah. 1929.

Prof. ZELLIG S. HARRIS, University of Pennsylvania, Philadelphia, Pa. 1931.

Rev. MAX H. HARRISON, Ph. D., United Theological College, Bangalore, South India. 1927.

Major HENRY H. HART, 210 Post. St., San Francisco, Calif. 1926.

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Rev. LOUIS HARTMAN, C. Ss. R., Mt. St. Alphonsus, Esopus, N. Y. 1937.

Mrs. ARTHUR W. HARTT, 160 Commonwealth Ave., Boston 16, Mass. 1942.

Pres. RAYMOND S. HAUPERT, Ph. D. (Moravian College & Theol. Seminary), 1841 Main St., Bethlehem, Pa. 1926.

Miss HELEN E. HAUSE, University Museum, University of Pennsylvania, 33rd and Spruce Sts., Philadelphia, Pa. 1943.

WALTER HAUSER, M. S., The Metropolitan Museum of Art, 5th Ave. at 82nd St., New York, N. Y. 1939.

Mr. JOHN L. HAWKEN, 112 Drake, South San Francisco, Calif. 1946.

Dr. A. EUSTACE HAYDON, Faculty Exchange, University of Chicago, Chicago, Ill. 1937. (1922).

WILLIAM C. HAYES, Ph. D., Metropolitan Museum of Art, New York, N. Y. 1936.

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Mr. THEODORE S. HECHT, 149 W. 77th St., New York, N. Y. 1940.

Mr. N. M. HEERAMANECK, 322 E. 57th St., New York 22, N. Y. 1931.

Dr. ALEXANDER HEIDEL, Oriental Institute, University of Chicago, Chicago 37, Ill. 1938.

Dr. ROBERT VON HEINE-GELDERN, American Museum of Natural History, Central Park West and 79th St., New York 24, N. Y. 1940.

Mr. RUFUS S. HENDON, Jr., 2715 Cortland Place, N. W., Washington 8, D. C. 1941.

Dr. WALTER B. HENNING, School of Oriental and African Studies, University of London, London, W. C. 1, England. 1946.

Rev. HENRY HERAS, Indian Historical Research Institute, St. Xavier's College, Bombay, India. 1934.

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Miss IRMA HIGHBAUGH, 100 Morningside Drive, New York, N. Y. 1945.

DOROTHY KENT HILL, Ph. D., The Walters Art Gallery, Baltimore, Md. 1940.

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Mr. W. H. HINDLE, c/o Henry Holt & Co., 257 4th Ave., New York 10, N. Y. 1945.

Prof. PHILLIP K. HITTI (Princeton Univ.), 106 Fitz-Randolph Road, Princeton, N. J. 1915.

Prof. WILLIAM ERNEST HOCKING, Ph. D., Madison, N. H. 1940.

Dr. CARLETON TAYLOR HODGE, 300 S. Abingdon St., Barcroft, Arlington, Va. 1941.

Prof. LEWIS HODOUS, 36 Main St., Northfield, Mass. 1919.

Mr. H. M. HOENIGSWALD, Dept. of Classical Languages, University of Texas, Austin 12, Texas. 1942.

Rev. J. MAURICE HOHLFELD, S. T. B., Th. M., Dept. of Modern Languages and Literature, Ursinus College, Collegeville, Pa. 1943.

Mr. HOWARD C. HOLLIS, The Cleveland Museum of Art, Cleveland 6, Ohio. 1936.

Pres. EDWARD J. HOLMES, Museum of Fine Arts, Boston 15, Mass. 1941.

PAUL HONIGSHEIM, Ph. D., Michigan State College, East Lansing, Mich. 1946.

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Prof. CLARK HOPKINS, University of Michigan, Ann Arbor, Mich. 1931.

Miss ISALINE B. HORNER, 30 Dawson Place, London, W. 2, England. 1943.

Mrs. LYNN HAROLD HOUGH, Drew Forest, Madison, N. J. 1932.

Prof. HERBERT PIERREPONT HOUGHTON, Carleton College, Northfield, Minn. 1944.

Miss MARGARET G. HOWLAND, Brooklyn Museum, Brooklyn 17, N. Y. 1947.

Dr. HU SHIH, University of Peiping, Peiping, China. 1943.

WALTER WHITELEY HUBBARD, D. D., Suite 1003, 2150 Pennsylvania Ave., N. W., Washington 7, D. C. 1943.

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WILSON M. HUME, Ph. D., Y. M. C. A. National Council, 5 Russell St., Calcutta, India. 1935.

Dr. ARTHUR W. HUMMEL, Chief Division of Orientalia, Library of Congress, Washington, D. C. 1928.

Rev. ROBERT C. HUNSICKER, S. T. B. 36-40 Bowne St., Flushing, N. Y. 1947.

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Mr. J. C. HUREWITZ, Apt. 2, 119 Waverly Place, New York, N. Y. 1945.

ELINOR MULLETT HUSSELMAN, Ph. D., University of Michigan Library, Ann Arbor, Mich. 1941.

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Prof. J. PHILIP HYATT, Ph. D., Vanderbilt University School of Religion, Nashville, Tenn. 1936.

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Prof. HARALD INGHOLT, Dept. of Classics, Yale University, New Haven, Conn. 1941. (1921).

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THORKILD JACOBSEN, Ph. D., Oriental Institute, University of Chicago, Chicago, Ill. 1938.

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DOUGLAS JAMES, M. A., 203 Marlborough Road, Brooklyn, N. Y. 1940.

Dr. OLOV R. T. JANSE, 2120 16th St., N. W., Washington, D. C. 1942.

Mr. HORACE H. F. JAYNE, Metropolitan Museum of Art, New York, N. Y. 1930.

Rev. Prof. ARTHUR JEFFERY (Columbia Univ.), 606 W. 122nd St., New York 27, N. Y. 1923.

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HELENE J. KANTOR, Ph. D., Hillside Drive, Bloomington, Ind. 1940.

GEORGE N. KATES, D. Phil., Brooklyn Museum, Eastern Parkway, Brooklyn 17, N. Y. 1942.

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Prof. ABRAHAM I. KATSH, Ph. D., 242 E. 19th St., New York 3, N. Y. 1941.

Rev. Dr. CLARENCE E. KEISER, Lyon Station, Pa. 1913.

GEORGE CAMP KEISER, B. Arch., The Middle East Institute, 1906 Florida Ave., N. W., Washington 9, D. C. 1947.

Mr. CARL T. KELLER, 80 Federal St., Boston 10, Mass. 1928.

Pres. JAMES A. KELSO, 515 S. Aiken Ave., Pittsburgh 6, Pa. 1915.

Prof. JAMES L. KELSO, D. D. (Pittsburgh Xenia Theol. Seminary), 616 W. North Ave., Pittsburgh 12, Pa. 1921.

Rev. JOHN M. KELSO, A. M., B. D., Wesley Junior College, Dover, Del. 1946. (1938).

Prof. E. S. KENNEDY, M. A., Ph. D., American University of Beirut, Beirut, Lebanon. 1946.

Prof. GEORGE A. KENNEDY (Yale Univ.), 228 Park St., New Haven 11, Conn. 1935.

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Rev. MARK KENNEDY, O. F. M., M. A., Lect. Glis. S. S., Siena College, Loudonville, N. Y. 1941.

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Mr. J. A. KERNS, New York University, Washington Square, New York, N. Y. 1936.

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Bishop WILLIS J. KING, Ph. D., The Methodist Church, Monrovia, Liberia, West Africa. 1941.

Mrs. LEA KISSELGOFF, 617 W. 113th St., New York, N. Y. 1944.

Chaplain WALTER C. KLEIN, St. George's Close, Jerusalem, Palestine. 1932.

Miss ALICE E. KOBER, 1050 E. 43rd St., Brooklyn 10, N. Y. 1943.

Dr. HANS N. VON KOERBER, Oriental Studies and Oriental Art, University of Southern California, Los Angeles 7, Calif. 1931.

Prof. GERARD P. KOK, Institute of Far East Language, Yale University, New Haven, Conn. 1942.

Mr. MORDECAI KOSOVER, 828 Newington Ave., Baltimore 17, Md. 1947.

Dr. E. A. KRACKE, Jr., 5716 Harper Ave., Chicago 37, Ill. 1937.

Dr. RUTH SCHLESINGER KRADER, c/o Far Eastern Institute, University of Washington, Seattle 5, Wash. 1947.

Prof. CARL H. KRAELING, Hall of Graduate Studies, Yale University, New Haven, Conn. 1925.

Prof. EMIL G. H. KRAELING, 531 E. 18th St., Brooklyn, N. Y. 1920.

Dr. SAMUEL NOAH KRAMER, University Museum, 33rd and Spruce Sts., Philadelphia, Pa. 1940 (1928, 1936).

R. P. KRAMERS, Sinol., Drs., c/o Prof. J. H. Kramers, 7 Frederik Hendriklaan, Oegstgeest, Holland. 1946.

Mr. HAROUTIUN KURDIAN, 1321 E. Douglas Ave., Wichita, Kans. 1934.

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Rev. WILLIAM L. LANCEY, Methodist Church, Parsippany, R. D. 1, Boonton, N. J. 1946.

Prof. GEORGE S. LANE, 735 Gimghoul Road, Chapel Hill, N. C. 1943.

Dr. IMELDE DELLA VALLE LANGEBARTEL, 3733 Locust St., Philadelphia 4, Pa. 1940.

Mr. AMBROSE LANSING, Metropolitan Museum of Art, New York, N. Y. 1921.

Prof. KENNETH S. LATOURETTE, Yale Divinity School, 409 Prospect St., New Haven, Conn. 1917.

Mr. OWEN LATTIMORE, Rolandview Road, Ruxton, Md. 1939.

BIMALA C. LAW, Ph. D., 43 Kailas Bose St., Calcutta, India. 1927.

Mrs. L. V. LEDOUX, 471 Park Ave., New York, N. Y. 1947.

Miss JEAN GORDON LEE, 1833 Pine St., Philadelphia 3, Pa. 1947.

LOW KEE LEE, M. S., Y. M. C. A., 276 Church St., Newton 58, Mass. 1947.

Prof SHAO CHANG LEE, 310 Morrill Hall, Michigan State College, East Lansing, Mich. 1928.

SHERMAN E. LEE, Ph. D., CIE GHQ SCAP, APO 500, c/o Postmaster, San Francisco, Calif. 1942.

Prof. WILLIAM ROCKWELL LEETE, Nanking Theological Seminary, 1 Shanghai Road, Nanking, China. 1937.

KURT F. LEIDECKER, Ph. D., P. O. Box 571, Troy, N. Y. 1928.

BARON DIETRICH VON LENTZ, Apt. 1107, 320 E. 42nd St., New York 17, N. Y. 1939.

Prof WOLF LESLAU, 144-44 Sanford Ave., Flushing, N. Y. 1942.

FERDINAND D. LESSING, Ph. D., 418 Library, University of California, Berkeley, Calif. 1943 (1937).

Prof. HERBERT C. LEUPOLD, B. D., D. D., 750 S. Roosevelt Ave., Columbus 9, Ohio. 1945.

Prof. GIORGIO LEVI DELLA VIDA, Oriental Studies, University of Pennsylvania, Philadelphia, Pa. 1939.

HILDEGARD LEWY, Ph. D., 543 Glenwood Ave., Cincinnati 29, Ohio. 1941.

Prof. JULIUS LEWY (Hebrew Union College), 543 Glenwood Ave., Cincinnati 29, Ohio. 1935.

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Dr. HERBERT LIEBESNY, 4629 S. 31st Road, Arlington, Va. 1941.

Mr. JOHN K. LINN, Jr., 70 Patton Ave., Princeton, N. J. 1947.

Prof. LO CHANG-PEI, Hall of Graduate Studies, Yale University, New Haven, Conn. 1946.

Dr. EDWIN M. LOEB, 1565 LaVereda, Berkeley, Calif. 1943.

Mr. JOHN A. LOGAN, W. Los Altos Road, Tucson, Ariz. 1943.

Miss ELMA LOINES, Bolton Landing, Lake George, N. Y. 1942.

Mr. C. T. LOO, 41 E. 57th St., New York, N. Y. 1941.

Rev. MARC H. LOVELACE, Th. D., Wake Forest College, Wake Forest, N. C. 1945.

Prof. HENRY LUDWIG F. LUTZ, Ph. D., D. D. (Univ. of California), 1147 Spruce St., Berkeley, Calif. 1916.

Prof. ALBERT HOWE LYBYER, Ph. D. (Univ. of Illinois), 808 S. Lincoln Ave., Urbana, Ill. 1917 (1909).

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Judge THOMAS F. MCALLISTER, U. S. Circuit Court of Appeals, Grand Rapids 1, Mich. 1945.

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Prof. S. VERNON MCCASLAND, Ph. D. (Univ. of Virginia), 854 Locust Ave., Charlottesville, Va. 1939.

Mr. GRANT V. MCCLANAHAN, 1615 Fort Dupont St., S. E., Washington, D. C. 1947.

Prof. WILLIAM H. MCCLELLAN, S. J., Woodstock College, Woodstock, Md. 1922.

Prof. CHESTER CHARLTON MCCOWN, Ph. D., Pacific School of Religion, Berkeley, Calif. 1920.

Miss D. BEATRICE MCCOWN, 1731 New Hampshire Ave., N. W., Washington 9, D. C. 1947.

Dr. DONALD E. MCCOWN, 1611 Scenic Ave., Berkeley 9, Calif. 1934.

Prof. W. S. MCCULLOUGH, M. A., University College, University of Toronto, Toronto 5, Ont., Canada. 1947.

Dr. SHANNON MCCUNE, Assistant Professor of Geography, Colgate University, Hamilton, N. Y. 1947.

RAVEN I. MCDAVID, Jr., Ph. D., Box 628, Greenville, S. C. 1943.

WILLIAM FRANCIS MCDONALD, Ph. D., Dept. of History, Ohio State University, Columbus 10, Ohio. 1940.

Lieut. Commdr. WILLIAM M. MCGOVERN, 6306 Florida St., Chevy Chase, Md. 1928.

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Mr. DUNCAN MACDOUGALD, Jr., Brevard, N. C. 1943.

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Prof. ALLAN A. MACRAE, Ph. D., 1205 Delaware Ave., Wilmington, Del. 1931.

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DOROTHY MADISON, M. A., 748 52nd St., Oakland, Calif. 1947.

OTTO J. MAENCHEN, Ph. D., 2100 Marin Ave., Berkeley 7, Calif. 1941.

Miss ALICE M. MAGINNIS, Museum of Fine Arts, Boston 15, Mass. 1939.

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Miss BLANCHE W. MAGURN, 48 Kenneth St., West Roxbury, Mass. 1942.

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Mr. CURTIS A. MANCHESTER, Jr., Dept. of Geography, University of Hawaii, Honolulu, Hawaii. 1941.

Dr. DAVID G. MANDELBAUM, Dept. of Anthropology, University of California, Berkeley 4, Calif. 1938.

Mr. FREDERICK J. MANN, U. S. Consulate, APO 154, c/o Postmaster, New York, N. Y. 1946.

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Prof. RALPH MARCUS, Oriental Institute, University of Chicago, Chicago, Ill. 1920.

Mrs. ELMA MARIN, 200, W. 58th St., New York 19, N. Y. 1942.

Rev. D. W. MARTIN, C. M., S. T. L., St. John's Seminary, 247 Felisa St., San Antonio 4, Texas. 1944.

Mr. RICHARD A. MARTIN, Chicago Natural History Museum, Roosevelt Road and Field Drive, Chicago 5, Ill. 1936.

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Mr. W. McC. Martin, Jr., 2444 Massachusetts Ave., N. W., Washington, D. C. 1947.

Prof. Alexander Marx, Jewish Theological Seminary, Cor. Broadway and 122nd St., New York 27, N. Y. 1926.

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William Arnot Mather, D. D., 29 Linden Lane, Princeton, N. J. 1938.

James K. Mathews, S. T. B., 54 Morningside Drive, New York 25, N. Y. 1947.

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Prof. Isaac G. Matthews, 173 B. Owen Ave., Lansdowne, Pa. 1921 (1906).

Baroness Annie Teixeira de Mattos, Beverly Hotel, 125 E. 50th St., New York, N. Y. 1943.

Prof. Herbert G. May, Ph. D., Graduate School of Theology, Oberlin, Ohio. 1935.

Rabbi Harry H. Mayer, 3512 Kenwood Ave., Kansas City 3, Mo. 1921.

Walter Mays, M. A., Liberty Life Insurance Co., Greenville, S. C. 1946.

Prof. Theophile J. Meek, Ph. D., F. R. S. A., University of Toronto, Toronto 5, Ont. Canada. 1917.

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Prof. George E. Mendenhall, Ph. D., Hamma Divinity School, Springfield, Ohio. 1940.

Prof. Karl H. Menges, Ph. D., 130 Morningside Drive, New York 27, N. Y. 1941.

Dr. James M. Menzies, O. I. C., A. D. F., China Branch, Social Security Bldg., R-3512, Washington, D. C. 1930.

Prof. Samuel A. B. Mercer, 193 Lake Ave., Newton Highlands 61, Mass. 1912.

Rev. Phillipp H. Mergler, Ph. D., 1001 Union St., Emporia, Kans. 1944.

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Rabbi Jacob Milgrom, The Anshe Emet Synagogue, Pine Grove at Grace, Chicago 13, Ill. 1947.

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Mr. Richard J. Miller, 1326 Arch St., Berkeley 8, Calif. 1946.

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Rev. Jacob M. Myers, S. T. D., 227 E. Middle St., Gettysburg, Pa. 1941.

Mr. M. M. Nagar, Curator, Provincial Museum, Lucknow, India. 1946.

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Prof. Toyozo W. Nakarai, Ph. D., College of Religion, Butler University, Indianapolis, Ind. 1926.

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Mr. J. Natarajan, First Secretary, Embassy of India, 2107 Massachusetts Ave., N. W., Washington, D. C. 1947.

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Katherine B. Neilson, Ph. D., Albright Art Gallery, Buffalo 9, New York. 1941.

Daniel Nelson, M. A., B. Th., Ph. D., Lutheran World Federation, 310 Hart Road, Shanghai, China. 1942.

Prof. Harold H. Nelson, Ph. D., 1155 E. 58th St., Chicago, Ill. 1941.

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Prof. Abraham A. Neuman, 2319 N. Park Ave., Philadelphia, Pa. 1937.

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Rev. Swami Nikhilananda, 17 E. 94th St., New York, N. Y. 1943.

Rev. Charles Francis Nims, Ph. D., Chicago House, Luxor, Egypt. 1931.

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Rev. FRANK NORTH, M. A., Nashotah, Wis. 1942.

Prof. F. S. C. NORTHROP, Silliman College, Yale University, New Haven, Conn. 1944.

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Prof. JULIAN J. OBERMANN, Ph. D., 322 Hall of Graduate Studies, Yale University, New Haven, Conn. 1923.

Rev. ROGER T. O'CALLAGHAN, St. Ignatius' Church, Calvert and Madison Sts., Baltimore 2, Md. 1943.

Office of the High Commissioner for India, The Librarian, India House, Aldwych, London, W. C. 2, England. 1928.

* Dr. CHARLES J. OGDEN, 435 Riverside Drive, New York, N. Y. 1906.

Miss ELEANOR OLSON, 11 Cornelia St., New York 14, N. Y. 1947.

Mr. HUGH B. O'NEILL, 36 Kenilworth Place, Brooklyn 10, N. Y. 1947.

Dr. A. LEO OPPENHEIM (Univ. of Chicago), 1122 East 54th Place, Chicago 37, Ill. 1941.

HARRY MEYER ORLINSKY, Ph. D., 2305 81st St., Brooklyn 14, N. Y. 1934.

Prof. CHARLES A. OWEN, 720 E. Archer Ave., Monmouth, Ill. 1921.

Mr. ROBERT TREAT PAINE, Jr., 2 Hubbard Park Road, Cambridge 38, Mass. 1935.

LEO PAP, A. M., F. I. L., 235 W. 102nd St., New York, N. Y. 1942.

Mr. HERBERT H. PAPER, Room 311, 6208 S. Drexel Ave., Chicago 37, Ill. 1946.

Dr. RICHARD A. PARKER, Oriental Institute, University of Chicago, Chicago 37, Ill. 1937.

Mr. HARRY B. PARTRIDGE, 404 University Ave., Ithaca, N. Y. 1943.

MARIE PARYSKI, Ph. D., 821 W. Woodruff Ave., Toledo 6, Ohio. 1941.

Mr. ROBERT LEET PATTERSON, 2122 Myrtle Drive, Durham, N. C. 1920.

Dr. JOHN H. PATTON, Westminster Hall, 1221 Oread St., Lawrence, Kans. 1941.

Dr. CYRUS H. PEAKE, 4616 Hunt Ave., Washington 15, D. C. 1930.

KATHARINE S. PEARCE, M. S., 55 Park Place, Princeton, N. J. 1940.

Miss ANN LOUISE PERKINS, Oriental Institute, University of Chicago, Chicago, Ill. 1936.

Mr. P. D. PERKINS, 1620 Mission St., South Pasadena, Calif. 1934.

Dr. MOSHE PERLMANN, 485 Central Park West, New York 25, N. Y. 1944.

Prof. BEN EDWIN PERRY, Ph. D., 504 Vermont Ave., Urbana, Ill. 1942.

Prof. PAUL W. PETERS, Ph. D., Lutheran Theological Seminary, Thiensville, Wis. 1944.

Rev. THEODORE C. PETERSEN, St. Paul's College, 4th and Hamlin Sts., N. E., Washington 17, D. C. 1924.

Pres. WILLIAM B. PETTUS, D. Ped., 1700 Spruce St., Berkeley 4, Calif. 1937.

Prof. ROBERT HENRY PFEIFFER, 57 Francis Ave., Cambridg 38, Mass. 1920.

Prof. DRYDEN LINSLEY PHELPS, West China Union University, Chengtu, Szechuan, West China. 1929.

* Rev. Prof. DAVID PHILIPSON, 712 Gholson, St., Cincinnati, Ohio. 1889.

Mr. KENNETH L. PIKE, c/o Woodrow Wilson Center, P. O. Box 18, Norman, Okla. 1945.

Prof. MALCOLM PITT (Hartford Seminary Foundation), 85 Sherman St., Hartford, Conn. 1937.

LESTER J. PLOWMAN, SF 2/c, 10th U. S. Naval Constr. Battalion, c/o F. P. O., San Francisco, Calif. 1945.

* Prof. JAMES MARSHALL PLUMER, 4016 Museums Bldg., University of Michigan, Ann Arbor, Mich. 1937.

Dr. HORACE I. POLEMAN, Indic Studies, Library of Congress, Washington, D. C. 1931.

Mr. ARTHUR UPHAM POPE, 9 E. 89th St., New York 28, N. Y. 1940.

Mr. JOHN A. POPE, Freer Gallery of Art, Washington, D. C. 1936.

* Mr. MARVIN H. POPE, Box 4912, Duke University, Durham, N. C. 1945.

* Prof. WILLIAM POPPER (Univ. of California), 529 The Alameda, Berkeley, Calif. 1897.

EDITH PORADA, Ph. D., 210 E. 38th St., New York, N. Y. 1939.

Mr. THURMAN R. POSTON, Jr., 409 Prospect St., Yale Divinity School, New Haven, Conn. 1947.

Mr. W. D. PRESTON, Box 25, Bennett Hall, University of Pennsylvania, Philadelphia, Pa. 1945.

Prof. MAURICE T. PRICE, Sociology Dept., Wayne University, Detroit 1, Mich. 1947.

Prof. EARL H. PRITCHARD, D. Phil. (Oxon.), Dept. of History, University of Chicago, Chicago 37, Ill. 1937.

Prof. JAMES BENNETT PRITCHARD, Ph. D., Crozer Theological Seminary, Chester, Pa. 1938.

Dr. J. PRUSEK, Oriental Institute, Prague III—Nerudova 14, Czechoslovakia. 1937.

Rev. Dr. A. H. PRUSSNER, 311 W. Wayne St., South Bend, Ind. 1920.

Dr. PIERRE M. PURVES, Oriental Institute, University of Chicago, Chicago, Ill. 1935.

Rev. Prof. CHARLES LYNN PYATT, The College of the Bible, Lexington, Ky. 1921 (1917).

ISAAC RABINOWITZ, Ph. D., c/o East New York Y. M. & Y. W. H. A., 645 Sheffield Ave., Brooklyn, N. Y. 1937.

Prof J. RAHDER, 307 Hall of Graduate Studies, Yale University, New Haven, Conn. 1946.

Mrs. M. ALMA REED, Mobile Press Register, Mobile 9, Ala. 1944.

Prof. WILLIAM L. REED, Dept. of Religion, Texas Christian University, Fort Worth, Texas. 1947.

Lt. Comdr. RALPH W. E. REID. 7415 Sprague St., Mt. Airy, Philadelphia, Pa. 1937.

JOSEPH REIDER, Ph. D., Dropsie College, Broad and York Sts., Philadelphia, Pa. 1913.

Dr. ERWIN REIFLER, Far Eastern Dept., University of Washington, Seattle 5, Wash. 1947.

JOHN F. REINHARDT, LL. B., LL. D., 1300 R. A. Long Bldg., Kansas City 6, Mo. 1946.

Prof. EDWIN O. REISCHAUER (Harvard Univ.), 26 Divinity Ave., Cambridge, Mass. 1939.

GEORGE S. RENTZ, Jr., M. A., 1186 Laurel St., Berkeley, Calif. 1940.

Mr. Stephen M. Reynolds, Lincoln University, Chester County, Pa. 1939.

Mohammed Abd al-Moneim Riad Bey, Counsellor of State, Egypt, 4 Amosis St., Heliopolis, Egypt. 1946.

Prof. V. A. Riasanovsky, 1855 Olive St., Eugene, Ore. 1938.

Mrs. Ruth S. Ricard, 40 Downing St., Brooklyn, N. Y. 1941.

Rev. Hilary Goode Richardson, 147 N. Broadway, Yonkers, N. Y. 1926.

Mr. H. Neil Richardson, Syracuse University, Syracuse 10, N. Y. 1945.

Mrs. Adele A. Rickett, 2042 Chestnut St., Philadelphia 3, Pa. 1947.

Mrs. Elizabeth Riefstahl, The Wilbour Library, Brooklyn Museum, Eastern Parkway, Brooklyn 17, N. Y. 1940.

Prof. Horace Abram Rigg, Jr., Ph. D., 16390 S. Park Boulevard, Cleveland 20, Ohio. 1937.

Prof. Corwin C. Roach, Gambier, Ohio. 1935.

Dr. Francis E. Roberds, 1705 Irving St., N. W., Washington 10, D. C. 1946.

Mr. Laurance P. Roberts, 1250 28th St., N. W., Washington, D. C. 1936.

Prof. David M. Robinson, The Johns Hopkins University, Baltimore 18, Md. 1921.

* Prof. George Livingston Robinson, 2424 Orchard St., Chicago, Ill. 1892.

Grace Robinson, Ph. M., Dr. ès Lettres, 238 E. 24th St., New York 10, N. Y. 1943.

Capt. Archibald B. Roosevelt, Jr., Pentagon 1-C-774, Washington, D. C. 1946.

Mrs. Gladys L. Rosen, 486 Brooklyn Ave., Brooklyn 25, N. Y. 1944.

Samuel Rosenblatt, Ph. D., 3605 Springdale Ave., Baltimore, 16, Md. 1939.

Miss Irene Roseney, Columbia University, Dept. of Anthropology, New York, N. Y. 1947.

Prof. Franz Rosenthal, Ph. D., Hebrew Union College, Cincinnati, Ohio. 1941.

Prof. A. Rosenvasser, Arribeños 1307, Buenos Aires, R. A., S. A. 1941.

Marvin Chauncey Ross, A. M., Assist. Curator of Mediaeval Art, Walters Art Gallery, Baltimore, Md. 1939.

Fr. Sisto Rosso, O. F. M., Caldwell Hall, Catholic University, Washington 17, D. C. 1946.

Dr. David Nelson Rowe, 205 Hall of Graduate Studies, Yale University, New Haven, Conn. 1936.

Mrs. Margaret T. J. Rowe, Gallery of Fine Arts, Yale University, New Haven 11, Conn. 1946.

Benjamin Rowland, Ph. D., 34 Coolidge Hill Road, Cambridge 38, Mass. 1937.

Rev. Prof. H. H. Rowley, D. D., 7 Carill Gardens, Fallowfield, Manchester 14, England. 1935.

* Miss Adelaide Rudolph, c/o White Collection, Public Library, Cleveland, Ohio. 1894.

Richard C. Rudolph, Ph. D., Royal Ontario Museum, Toronto 5, Canada. 1937.

Otto B. Rupp, LL. D., 660 Colman Bldg., Seattle, Wash. 1931.

Prof. Elbert Russell, 2619 Bayside Drive Square, St. Petersburg 5, Fla. 1916.

Mr. Peter Ruthven, 815 South University, Ann Arbor, Mich. 1933.

Prof. A. J. Sachs, Brown University, Providence, R. I. 1936.

Comdr. Robert L. Sage, 3901 47th St., N. W., Washington 16, D. C. 1934.

Mr. Shunzo Sakamaki, University of Hawaii, Honolulu, Hawaii. 1937.

Dr. Alfred Salmony, 17 E. 80th St., New York 21, N. Y. 1934.

Prof. Henry A. Sanders, Ph. D., University of Michigan, Ann Arbor, Mich. 1924.

Sir George Sansom, K. C. M. A., British Embassy, Washington, D. C. 1940.

Mr. H. Stefan Santesson, Box 15, 333 E. 11th St., New York. 1944 (1936, 1941).

Maj. Clyde B. Sargent, AUS, 408 Oakwood St., S. E., Washington 20, D. C. 1938.

Mr. H. Medill Sarkisian, 615 E. 12th Ave., Denver, Colo. 1939.

George Sarton, Sc. D., L. H. D., LL. D., Harvard Library, 185, Cambridge, Mass. 1934.

Mrs. Ruth F. Sasaki, 124 E. 65th St., New York 21, N. Y. 1930.

Mr. Arnold Satterthwaite, 635 Walnut Lane, Haverford, Pa. 1946.

Rev. Lauriston L. Scaife, S. T. D., Calvary Episcopal Church, Shady Ave., Pittsburg 6, Pa. 1936.

Edward H. Schafer, Ph. D., 1520 Holly St., Berkeley 3, Calif. 1946.

Mr. Philip Scherer, 941 Washington Ave., Brooklyn 25, N. Y. 1946.

Erich F. Schmidt, Ph. D., The Oriental Institute, 1155 E. 58th St., Chicago, Ill. 1930.

Mrs. Ewald H. Schniewind, North St., Greenwich, Conn. 1944.

Prof. F. D. Schultheis, M. A., 203 Hartsdale Road, White Plains, N. Y. 1940 (1930).

Benjamin Schwartz, Ph. D., 303 B St., S. E., Washington 3, D. C. 1937.

Joseph J. Schwartz, Ph. D., 125 W. 76th St., New York, N. Y. 1939.

Miss Nora E. Scott, Metropolitan Museum of Art, New York 28, N. Y. 1947.

Rev. Roland W. Scott, M. A., c/o Board of Missions, 150 5th Ave., New York 11, N. Y. 1947.

* Mrs. Samuel Bryan Scott, Cresheim Arms, Chestnut Hill, Philadelphia 19, Pa. 1903.

Dr. Thomas A. Sebeok, Indiana University, Bloomington, Ind. 1943.

Dr. Keith C. Seele, 5411 S. Dorchester Ave., Chicago, Ill. 1926.

Mr. Kenneth Seifert, Box 393A, R. R. 5, Evansville, Ind. 1940.

* Rev. Dr. William G. Seiple, Greenway, Apt. 102, 110-34th St., S. E., Washington, D. C. 1902.

Dr. Ralph Sell, American Lutheran Mission, Tsingtao, Shangtung, China. 1940.

Prof. O. R. Sellers (Presbyterian Theol., Seminary), 835 Chalmers Place, Chicago, Ill. 1917.

Prof. W. T. Semple, 1202 Times-Star Bldg., Cincinnati 2, Ohio. 1928.

Dr. MUZAFFER SENYÜREK, Box 38, Washington 4, D. C. 1947.

Rev. E. W. SERAPHIN, St. Stephen's Monastery, Croghan, N. Y. 1935.

Mr. ROBERT SHAFER, Berkeley Inn. Berkeley, Calif. 1940.

Mr. G. HOWLAND SHAW, 2723 N St., N. W., Washington 7, D. C. 1921.

Mr. EPHRAIM C. SHEDD, 6042 Dorchester Ave., Chicago, Ill. 1936.

Mr. JAMES GAIL SHELDON, 505 Catherine St., Walla Walla, Wash. 1945.

* Prof. CHARLES N. SHEPARD (General Theol. Seminary), 520 W. 114th St., New York, N. Y. 1941 (1907).

LOUISE ADELE SHIER, Ph. D., 1320 Olivia Ave., Ann Arbor., Mich. 1930.

C. C. SHIH, Ph. D., School of Chinese Studies, University of Toronto, Toronto, Ont., Canada. 1947.

MARY H. SHIMER, Ph. D., 42 Cottage St., Hingham, Mass. 1940.

Mr. OSAMU SHIMIZU, 532 W. 114th St., New York 25, N. Y. 1939.

ICHIRO SHIRATO, M. A., 414 W. 118th St., New York 27, N. Y. 1947.

HIDE HELEN SHOHARA, Ph. D., Dept. of Oriental Languages, University of Michigan, Ann Arbor, Mich. 1947.

Dr. JOHN KNIGHT SHRYOCK, 4509 Regent St., Philadelphia 43, Pa. 1922.

Mr. LAWRENCE C. S. SICKMAN, Curator of Oriental Art, William Rockhill Nelson Gallery of Art, Kansas City, Mo. 1937.

R. LAWRENCE SIEGEL, LL. B., 1718 Grand Ave., Bronx, New York, N. Y. 1942.

Rabbi ABBA HILLEL SILVER, D. D., The Temple, E. 105th St. at Ansel Road, Cleveland, Ohio. 1920.

Prof. C. A. SIMPSON, Th. D., D. D., 6 Chelsea Square, New York, N. Y. 1942.

MEHMED A. SIMSAR, D. C. S., 1 University Place, New York, N. Y. 1934.

Rev. PATRICK W. SKEHAN, S. T. D., Catholic University of America, Washington 17, D. C. 1939.

Dr. JOSEPH SKINNER, 103 Irving St., Cambridge 38, Mass. 1942.

Prof. SOLOMON L. SKOSS, Ph. D., The Dropsie College, Broad and York Sts., Philadelphia, Pa. 1926.

Rev. CHARLES O'CONOR SLOANE, St. Joseph's Seminary, Yonkers, N. Y. 1941.

Mr. MAYER G. SLONIM, 64 Almont St., Malden 48, Mass. 1947.

Mr. CHARLES L. SMITH, 3609 Crescent Avenue, Indianapolis 23, Ind. 1947.

Dr. HENRY LEE SMITH, Jr., 4214 N. 15th St., Arlington, Va. 1937.

Prof. LOUISE PETTIBONE SMITH, Ph. D., Wellesley College, Wellesley, Mass. 1918.

Miss MARGUERITE SMITH, Zion Research Library, 120 Seaver St., Brookline 46, Mass. 1941.

MARIAN W. SMITH, M. A., Ph. D., Dept. of Anthropology, Columbia University, New York 27, N. Y. 1946.

Mr. MYRON BEMENT SMITH, Oriental Institute, University of Chicago, Chicago 37, Ill. 1930.

WAYNE C. SMITH, LL. B., 166 Ashley Ave., West Springfield, Mass. 1943.

Mr. WILLIAM STEVENSON SMITH, Museum of Fine Arts, Boston, Mass. 1941.

Rabbi ELIAS L. SOLOMON, D. H. L., 875 West End Ave., New York 25, N. Y. 1921.

Mr. F. E. SOMMER, c/o Cleveland Public Library, Cleveland, Ohio. 1937.

ALEXANDER C. SOPER, 3d, M. F. A., 1441 Orchard Way, Rosemont, Pa. 1939.

Rev. WILLIAM S. SPARKS, School of Religion, Butler University, Indianapolis 7, Ind. 1947.

Prof. E. A. SPEISER, Ph. D., 7601 West Ave., Elkins Park, Philadelphia 17, Pa. 1925.

F. ST. G. SPENDLOVE, F. R. G. S., Royal Ontario Museum of Archaeology, Toronto, Ont., Canada. 1941.

Prof. ALEXANDER SPERBER, Ph. D., 7 George Eliot St., Tel Aviv, Palestine. 1935.

Prof. SHALOM SPEIGEL, Ph. D., 309 W. 93rd St., New York 25, N. Y. 1936.

FREDERIC SPIEGELBERG, B. D., Ph. D., 135 Harriet Ave., Palo Alto, Calif. 1939.

Rev. H. HENRY SPOER, Ph. D., 21 E. 14th St., New York 3, N. Y. 1926.

Prof. PAUL W. SPRAGUE, Ph. D., Wheaton College, Norton, Mass. 1941.

Prof. MARTIN SPRENGLING, R. F. D., Tamworth N. H. 1929 (1912).

Dr. CHARLES A. STANLEY, 2227 Ward St., Berkeley 5, Calif. 1943.

Rev. DAVID MICHAEL STANLEY, S. J., Jesuit Seminary, 403 Wellington St., West, Toronto, 2B, Ont., Canada. 1947.

W. E. STAPLES, Ph. D., Victoria University, Toronto, Ont., Canada. 1927.

Mr. JAMES D. STAVER, 920 Hyde Park Boulevard, Chicago 15, Ill. 1945.

Mr. REXFORD STEAD, Apt. J-5, 1305 Post Road, Rye, N. Y. 1946.

Mr. FRANCIS RUE STEELE, University of Pennsylvania Museum, 33rd and Spruce Sts., Philadelphia 4, Pa. 1938.

Prof. G. NYE STEIGER, 27 Linnaean St., Cambridge 38, Mass. 1930.

DIETHER VON DEN STEINEN, Ph. D., 3032 Q St., N. W., Washington 7, D. C. 1939.

Rev. JOHN E. STEINMUELLER, D. D., S. S. L., Seminary of the Immaculate Conception, Huntington, N. Y. 1937.

Mr. CHARLES C. STELLE, 31 Madison St., Cambridge, Mass. 1938.

Prof. FERRIS J. STEPHENS, Babylonian Collection, Yale University, New Haven, Conn. 1925.

Prof. LUDWIK STERNBACH, 41-42 40th St., Sunnyside, Long Island City, N. Y. 1947.

Dr. ROBERT O. STEUER, 19 E. 76th St., New York, N. Y. 1944.

Mr. CHAUNCEY STILLMAN, 230 Park Ave., New York 17, N. Y. 1942.

Prof. WILLIAM F. STINESPRING, Ph. D. (Duke Univ.), 1107 Watts St., Durham, N. C. 1937.

* Rev. ANSON PHELPS STOKES, D. D., LL. D., "Brook Farm," Lenox, Mass. 1900.

Mr. J. G. PHELPS STOKES, 33 Madison Ave., New York, N. Y. 1940.

Miss ELIZABETH STROUT, Yale University Library, New Haven, Conn. 1943.

* Prof. EDGAR H. STURTEVANT, Hall of Graduate Studies, Yale University, New Haven, Conn. 1924.

Mr. J. P. KAULESAR SUKUL, 11 Verlengde Mahonylaan, Paramaribo, Surinam. 1946.

Mr. W. A. SUMANA-SEKERA, St. Shaubern, 4th Cross Road, Panadura, Ceylon. 1946.

RAYMOND F. SURBURG, A. M., Th. D., Bethlehem Lutheran Church, 4th Ave. at Ovington Ave., Brooklyn, N. Y. 1944.

Prof. JOSEPH WARD SWAIN, 309 Lincoln Hall, Urbana, Ill. 1937.

Dr. NANCY LEE SWANN, Curator, The Gest Oriental Library, Institute for Advanced Study, Princeton, New Jersey. 1932.

DONALD C. E. SWANSON, Ph. D., 1746 Shields Ave., St. Paul 4, Minn. 1940.

Prof. MARY HAMILTON SWINDLER, Low Bldgs., Bryn Mawr, Pa. 1929.

Dr. VICTOR H. SWORD, Ganhati, c/o American Baptist Mission, Assam, India. 1945 (1935).

PIERRE ERVIN SZAMEK, M. A., 30 VanVelsor Place, Newark 8, N. J. 1947.

Miss MARGARET TAVENNER, University of Michigan, 603 E. Madison St., Ann Arbor, Mich. 1947.

GEORGE E. TAYLOR, M. A., Dept. of Oriental Studies, University of Washington, Seattle, Wash. 1940.

Rev. GORDON R. TAYLOR, M. A., Carleton Place, Ottawa, Ontario, Canada. 1935.

Rev. THEOPHILUS MILLS TAYLOR, D. D., Pittsburgh-Xenia Theological Seminary, 616 W. North Ave., Pittsburgh 12, Pa. 1946.

Prof. WILLIAM R. TAYLOR, Ph. D., D. D., University of Toronto, Toronto, Ont., Canada. 1925.

T/Sgt. ZACHARY TAYLOR, U. S. A., 16 Sig. Opn. Bn. Co. A, Fort Sam Houston, Texas. 1932.

Prof. CHAIM TCHERNOWITZ, 620 Riverside Drive, New York, N. Y. 1928.

Dr. PAUL TEDESCO, Apt. 4A, 57 Marvel Road, New Haven, Conn. 1939.

Rev. ELMER J. TEMPLETON, 8021 Keating Ave., Skokie, Ill. 1938.

Mr. SSU-YU TENG, 226 Oriental Institute, University of Chicago, Chicago, Ill. 1942.

Mrs. SARAH CAMILLE TENNEY, 406 Orange St., New Haven, Conn. 1947.

Dr. S. M. TENNEY, 1512 E. Grove St., Bloomington, Ill. 1947.

SAMUEL L. TERRIEN, Th. D., Union Theological Seminary, Broadway at 120th St., New York, N. Y. 1946 (1941).

Prof. EDWIN R. THIELE, Ph. D., Emmanuel Missionary College, Berrien Springs, Mich. 1940.

Rev. ALEXANDER W. THOMAS, S. T. B., Box 292, Wilberforce University, Wilberforce, Ohio. 1942.

Hon. ELBERT D. THOMAS, PH. D., LL. D., Litt. D., 442 Senate Office Bldg., Washington, D. C. 1938.

Mr LEWIS V. THOMAS, 918 Morgan Ave., Rushville, Ind. 1937.

Miss MARY ELIZABETH THOMAS, c/o Guaranty Trust Co., 524 5th Ave., New York 18. N. Y. 1941.

Mrs. WINIFRED SMEATON THOMAS, The Iranian Institute, 9 E. 89th St., New York 28, N. Y. 1931.

MARY LYON THOMPSON, A. M., c/o Pressly Memorial Institute, Assiut, Egypt. 1941.

Prof. WILLIAM THOMSON, Room 546, Widener Library, Harvard University, Cambridge, Mass. 1925.

Dr. MISCHA TITIEV, University of Michigan, Ann Arbor, Mich. 1938.

Prof. S. DU TOIT, 2 Joostestr., Potchefstroom, South Africa. 1947.

Mr. KOJIRO TOMITA, Museum of Fine Arts, Boston 15, Mass. 1934.

* Prof. CHARLES C. TORREY (Yale Univ.), 191 Bishop St., New Haven, Conn. 1891.

* Mr. EDWARD P. TORREY, 122 Victory Drive, Rome, N. Y. 1945.

Prof. PRESCOTT W. TOWNSEND, 1200 E. 1st St., Bloomington, Ind. 1939.

Dr. GEORGE L. TRAGER, University of Oklahoma, Norman, Okla. 1943.

Mr. BERNARD B. TRINSEY, 414 E. 52nd St., New York, N. Y. 1943.

Prof. HAROLD H. TRYON, 3041 Broadway, New York, N. Y. 1921.

Mr. RYUSAKU TSUNODA, The Library, Columbia University, New York, N. Y. 1937.

DAVID O. TUBBS, M. A., 814 E. 44th St., Chicago 15, Ill. 1944.

Rt. Rev. H. ST. GEORGE TUCKER, D. D., 6501 Three Chopt Road, Richmond 21, Va. 1937.

Prof. JUDITH TYBERG, c/o Port Orient Book Co., 1252 1st Ave., San Diego 1, Calif. 1942.

Mr. JOSEPH M. UPTON, 3629 Prospect Ave., N. W., Washington, D. C. 1931.

YUKUO UYEHARA, M. A., The Oriental Institute, University of Hawaii, Honolulu, Hawaii. 1939.

Miss AMBER VAN, 169 Yuen Ming Yuen Road, Shanghai, China. 1945.

Mr. MAXINE VELAY, 1125 5th Ave., New York, N. Y. 1946.

Prof. GEORGE VERNADSKY, M. R. H. (Yale Univ.), 1984 Yale Station, New Haven, Conn. 1932.

Prof. CARL VOEGELIN, Indiana University, Bloomington, Ind. 1942.

Dr. MAX VOGELSTEIN, Hebrew Union College, Cincinnati 20, Ohio. 1939.

* Mrs. SOPHIE CAMACHO WADIA, c/o Theosophy Co., Ltd., 51 Mahatma Gandi Road, Bombay, India. 1927.

Mr. MERRILL Y. VAN WAGONER, 1300 York Ave., New York 21, N. Y. 1943.

HELEN K. WALL, M. A., 78 Jane St., New York, N. Y. 1946.

REUBEN WALLENROD, M. A., Ph. D., 1201 Ave. K, Brooklyn 30, N. Y. 1944.

Prof. H. WALTER, Ph. D., McGill University, Montreal, Que., Canada. 1947.

Prof. JAMES R. WARE, Ph. D., 1 Highland Terrace, Winchester, Mass. 1923.

Miss FLORENCE WATERBURY, 1035 5th Ave., New York 28, N. Y. 1942.

* Prof. LEROY WATERMAN, University of Michigan, Ann Arbor, Mich. 1912.

Mr. GOBINDRAM J. WATUMULL, 937 Malcolm Ave., Los Angeles 24, Calif. 1945.

* Prof. HUTTON WEBSTER, 2025 Cowper St., Palo Alto, Calif. 1921.

Prof. A. G. WEHRLI, 114 Park Road, Webster Groves 19, Mo. 1937.

Miss ELSIE WEIL, c/o Asia Magazine, 40 E. 49th St., New York, N. Y. 1935.

Mr. RALPH WEIMAN, Room 1917, 165 Broadway, New York, 6, N. Y. 1943.

MARIAN WELKER, Ph. D, Highland, Ulster Co., N. Y. 1939.

Prof. C. BRADFORD WELLES (Yale Univ.), 1544 Yale Station, New Haven, Conn. 1940.

Dr. RULON S. WELLS, Hall of Graduate Studies, Yale University, New Haven 11, Conn. 1946.

Mr. WILLIAM W. WELLS, 59 Brookside Drive, Rochester, N. Y. 1946.

Mr. WILLIAM E. WELMERS, American Lutheran Mission, Monrovia, Liberia, West Africa. 1941.

Mr. ARCHIBALD GIBSON WENLEY, Freer Gallery of Art, Washington 25, D. C. 1925.

Rev. THAYER A. WESTLAKE, 136 E. Herman St., Philadelphia 44, Pa. 1946.

JOHN WILLIAM WEVERS, Th. D., 106 Stockton St., Princeton, N. J. 1945.

Mr. LIONEL A. WHISTON, Jr., 1 Hanover St., Newbury, Mass. 1944.

The Rt. Rev. WILLIAM C. WHITE, Royal Ontario Museum, Toronto, Ont., Canada. 1935.

Prof THOMAS WHITTEMORE, Byzantine Institute, 712 Sears Bldg., Boston 8, Mass. 1945.

* Miss CAROLYN M. WICKER, c/o Ryerson Library, Art Institute, Chicago, Ill. 1921.

Dean ROCKWELL WICKES, Ph. D., 7314 Piney Branch Road, Takoma Park, Md. 1937.

Prof. GEORGE WIDENGREN, Rundelsgränd 3, Uppsala, Sweden. 1947.

HEROLD JACOB WIENS, M. A., Del Rio, Tenn. 1947.

Mr. C. MARTIN WILBUR, 1625 Fitzgerald Lane, Alexandria, Va. 1937.

Mr. CHARLES KYRLE WILKINSON, The Metropolitan Museum of Art, 5th Ave. at 82nd St., New York 28, N. Y. 1939.

Miss ENID V. WILKINSON, American Consulate Bldg., A. P. O. 343, c/o Postmaster, San Francisco, Calif. 1947.

Rev. BERNWARD H. WILLEKE, O. F. M., Ph. D., St. Bonaventure College, St. Bonaventure P. O., N. Y. 1946.

Rev. RONALD JAMES WILLIAMS, M. A., B. D., University College, University of Toronto, Toronto, 5, Ont., Canada. 1941.

Prof. WALTER G. WILLIAMS, Ph. D., The Iliff School of Theology, Denver, Colo. 1932.

Prof. JOHN A. WILSON, Oriental Institute, University of Chicago, Chicago 37, Ill. 1924.

Mr. HERBERT E. WINLOCK, Metropolitan Museum of Art, New York, N. Y. 1919.

Prof. FREDERICK V. WINNETT, Ph. D., The University College, Toronto, Ont., Canada. 1935.

Miss BEATRICE WINSER, Director the Newark Museum Association, 49 Washington St., Newark 2, N. J. 1947.

Mrs. RACHEL WISCHNITZER-BERNSTEIN, 87 Hamilton Place, New York 31, N. Y. 1940.

* Rev. Dr. STEPHEN S. WISE, 40 W. 68th St., New York 23, N. Y. 1894.

Dr. KARL AUGUST WITTFOGEL, 420 Riverside Drive, New York, N. Y. 1938.

Rev. CARLYLE WITTON-DAVIES, M. A., St. George's Close, Jerusalem, Palestine. 1947.

Prof. ROLLAND E. WOLFE, Ph. D., 3047 Edgehill Road, Cleveland Heights 18, Ohio. 1932.

Prof. HARRY A. WOLFSON, 45 Widener Library, Cambridge, Mass. 1917.

LYNN H. WOOD, Ph. D., Seventh-day Adventist Theological Seminary, Takoma Park, Washington, D. C. 1940.

Mr. DWIGHT E. WOODBRIDGE, 124 Standish Arms, 169 Columbia Heights, Brooklyn 2, N. Y. 1944.

JUNE WORK, Ph. D., 5704 Kenwood Ave., Chicago, Ill. 1941.

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